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THE SCHOOL GARDENER

by

J. NORRIS

CRAVEN PARK SCHOOL GARDENING CLASS

The School Gardener

By
J. NORRIS

With Preface by
HENRY PARSONS, F.R.H.S.

Fully Illustrated

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PREFACE

THE recent appeal of the Government for increased home production of vegetables and fruit met with an enthusiastic response from the public, and resulted in the astonishing number of allotments and allotment societies now flourishing throughout the country.

Education Authorities, too, have not been backward in supporting the appeal, and, as a consequence, School Gardens are now to be numbered in thousands.

Owners of gardens attached to front and rear of house or cottage have also patriotically responded—the flower plot and lawn have been abolished or reduced, and the barren waste made fertile.

Such being the case, no apology can be needed for adding another small manual to the existing stock of gardening lore. The present work embodies the results of many years of teaching, observation, and practical experience in this subject, and is especially intended to assist teachers of School Gardening and their pupils, allotment holders, and owners of private gardens.

They will find this manual a useful vade mecum. Whilst not intended or expected to supersede the useful weekly gardening paper, it may undoubtedly serve as a cheap and convenient reference book should any doubt or difficulty arise.

PREFACE

The Flower Garden will gradually but ultimately come into its own again, so that the section dealing with this branch of the subject will prove of exceptional interest and utility. It may be added (sub rosa) that Floriculture is the author's favourite hobby.

It will be noticed that Botanical names are omitted, and that the science of Botany has been drawn upon as sparingly as possible. Every effort has been made to keep to the practical side of the subject, although, as an aid to intelligent work, an elementary knowledge of the structure and functions of plants being essential, sections will be found dealing with such matters in simple language.

The present writer, a teacher of School Gardening of long standing, has been asked to add this foreword to the book. He has taught the subject since 1897, some years before it was added to the School curriculum. When it was placed by the Government on the list of grant-earning subjects, his class received immediate recognition, and thus obtained the honour of heading the roll of School Gardens in the register of the Board of Education.

The above remark having been made by way of credentials, this work is strongly recommended to the various workers in the garden, and especially to teachers.

The latter would do well to encourage their gardening pupils to :—

(*a*) Buy this or some other manual for reference.

(*b*) Take in a weekly gardening paper.

(*c*) Submit weekly notes, comprising illustrations and comments upon such gardening topics as may have come under notice from plot, newspaper, conversation, etc.

Of all the items in the School time-table gardening has been found to be the most popular. In no other lesson can teacher and pupil be brought together so closely and so beneficially as in the "Aristocracy of Gardening." Nature appeals so forcibly to the young—human life, with its birth, youth, adolescence, old age and death, all symbolised in the growth of the plants under their care. "Dirty but happy" is the motto for the School Garden, and is applicable to both teacher and taught. No more diffidence is shown in handling manure than in picking gooseberries or masticating toffee.

Around the School Garden are many hundreds of allotments, some cultivated by old gardening pupils. These young fellows have freely rendered great assistance to beginners working in adjacent plots. A former foreman of the gardening class, placed during the war in the Labour Battalion, was found congenial employment near Stirling in raising millions of vegetable plants for growing around soldiers' hutments. There is nothing like catching your gardener young.

Co-ordination should be carried on with the Handicraft Centre. There are constructed cold frames, seed boxes for sprouting potatoes, labels for plants, pea-guards, etc. The cold greenhouse here was built by the

pupils, as also the tool-house, box shed, wood shelter, rose pergola, etc. During winter, ground is manured in suitable weather, paths dug up and renewed with ashes, borders repaired, etc. In wet weather notes are taken, seed catalogues examined, seeds inspected and identified, sketches drawn of flowers, tools, plants, etc. Thus work is found for a whole year's course.

HENRY PARSONS, F.R.H.S.

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INTRODUCTION

"It's an ill wind that blows nobody good." If the war has done much evil, it at least has done some good in giving a great impetus to gardening and food production. Gardening, without doubt, is a healthy and profitable hobby, which brings much pleasure and enjoyment to a person who is not afraid of work, and to one who is not dismayed by trifling failures. The young gardener must be prepared for failures; he must try to find out the cause and the remedy. Failures are often blessings in disguise, for we may learn more from them than from successes. To enable the young gardener to find out the cause of the failure, note-making is absolutely necessary. Notes must be made of the preparation of the soil, manuring, date and depth of sowing, weather, growth, attacks by insect pests, waterings, etc. If the cause of failure is not then discovered, try to find out what has been left undone. Sometimes the cause is due to something (e.g. a late frost) over which there is no control; but, whatever the cause may be, keep on smiling and hope for better luck next tir

To be successful a gardener must carry out each part of his work in its proper season. To be too early or too late is to court failure. A beginner in gardening had sown all his seeds—runner-beans, marrow, beet, etc., and set his potatoes on his allotment, by the end of February. The result was disastrous. Two allotment holders were comparing crops, when one paid the

other a great compliment. He said, "Your crops are splendid; but, you see, you always do things at the right time."

A good gardener is always willing to learn and is ready to adopt new methods when he finds they are more successful than his own. He will find that while one method is best in one district—or on one kind of soil—another method is more successful under different conditions. He is always experimenting. This not only helps to make him a better gardener, but it also makes his work much more interesting. He is also ready to try new varieties. In the school garden this should be done on the Experimental or on the Common Plot. Gardeners generally are more ready to adopt new varieties of flowers than they are of vegetables. They should remember that the standard varieties they stick to were once new and have replaced inferior varieties, and that in a similar way newer varieties will be produced which will be superior to the present standard varieties. This is especially the case now when the value of greater food production is recognised everywhere. We may expect, in the near future, new varieties of vegetables which will be more prolific, of better shape and quality, of greater food value, and either be immune from certain diseases, or at any rate be more disease-resistant than are our present varieties. At the present time we have new varieties of potatoes which are said to be immune from wart disease, and they only are allowed by the Government to be planted in districts where this disease is prevalent. We may hope to get a new black currant which will be immune from the big bud. When a new variety is tried, let it be done on a small scale, and let

it be remembered that a new variety may be a success on one soil and a failure on another kind of soil.

While one set of experts is busy raising new varieties of plants, another is busy trying to discover new remedies for diseases and insect pests. The gardener can make himself acquainted with new discoveries only by reading. He should read a weekly gardening paper, e.g. "The Gardener," and he should obtain the leaflets issued by the Board of Agriculture, 3, St. James's Square, London, S.W. Write for list of publications. No stamp is needed. The leaflets are supplied free.

The intelligent gardener should have some acquaintance with various sciences connected with the garden, e.g. Botany, Geology, Meteorology, Chemistry, Bacteriology.

I have given no plans for a school garden because circumstances will compel varied plans to be adopted. A plan is given of Craven Park L.C.C. school garden which was the first school garden in England to be recognised by the Board of Education.

There should be common plots for the growth of permanent crops, like fruit, rhubarb, herbs, asparagus, etc. An experimental plot is essential.

The garden should be made attractive by flower beds, arches and pillars for roses, clematis, honeysuckle, etc. This will help to make the young gardeners proud of their garden, and stimulate their interest.

Finally I offer my grateful thanks to Mr. H. H. Thomas (The Editor of "The Gardener") and Mr. H. Parsons, F.R.H.S., for reading the proofs, and to the latter also for the many suggestions and the help he has given me in compiling this little book.

J. NORRIS.

STOW UPLAND SCHOOL GARDEN

THE SCHOOL GARDENER

CHAPTER I

The School Garden

THE School Garden should be within easy reach of the School, and should be fenced where possible. The pupils then have a sense of ownership which will be lacking if the School Garden is a part of a common allotment area. The greater the interest that can be aroused the greater will the results be. If a choice can be made the ground should slope in a southerly direction. A slope to the north should be avoided. The garden should not be situated near large trees whose roots will rob the ground of its nutriment, and, to a large extent, nullify the work of the young gardeners.

In some cases the garden, owing to lack of space, will have to be worked as a common plot, but where possible pupils' plots either on the single or dual plan should be adopted. There will be common plots also in both these systems. The pupils' plots should be arranged in the centre of the garden, so that all may be, if possible, of the same shape and size. They should be arranged so that the rows may run across the plots as nearly north and south as possible.

The plots should be at least four times as long as they are wide to enable a great variety of vegetables to be grown. The single plots should be at least 1 square

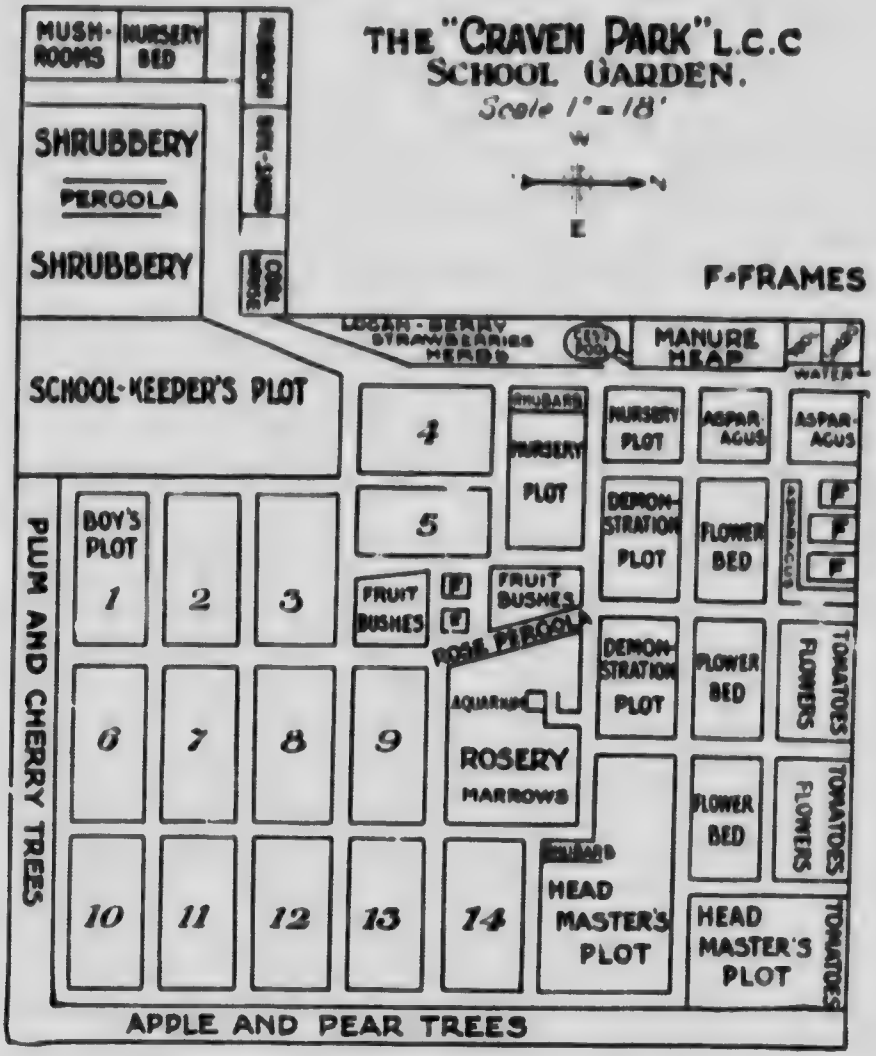
rod in area, and the dual plots at least 2 square rods. The paths between the plots should be about 2 feet wide, while those at the ends of the plots should be wider. The paths should be made, if possible, with large stones for the foundation, then smaller stones with gravel or ashes for the surface. They should be kept well rolled. If they are of grass they should be kept neatly trimmed and cut. Where there is no artificial drainage, and the subsoil is clay, care must be taken to trench under the paths when the plots are trenched, or the lower ends of the plots will become underground ponds with disastrous results to the plants grown there. Where flowers are grown only a very small part of the plot should be devoted to them.

Plans of cropping should be drawn out during the winter months. The elder boys should be allowed to suggest their own plans. Care must be taken to secure Rotation, and therefore the plans of cropping should be preserved from season to season.

If the plots are divided into three parts as suggested in the chapter on Rotation of Crops, the same part of all plots should be used for growing the same kind of vegetables, e.g. if part A on one plot is used for growing potatoes, then part A on all plots should be used for growing potatoes. The young gardener must look ahead, and therefore each plan of cropping should indicate what the succeeding crop will be.

The experimental plot, and plots for either permanent or awkward plants—e.g. fruit trees, rhubarb, asparagus, seakale, strawberries, marrows—seed and cutting beds, herb beds, flower beds, etc. can be arranged round the pupils' plots, while places must be found for the manure heap, compost heap, frames and loam.

A shed to hold the tools and seeds should be erected near the entrance, while arrangements should be made for an adequate water supply.



In another place I have suggested the steps to be taken to make the garden ornamental.

Where School Gardening is taught to girls, and

there is every reason why it should be, the above plans may be modified, and more attention paid to the culture of flowers, but this must not be allowed to eclipse the culture of vegetables. About one quarter of the plot may be used for floriculture. Each plot should be about one square rod in area, and should be worked by two girls. The stronger girl should do the harder work, and tools, lighter than those used by the boys, should be provided. To ensure success, the girls must be taught deep cultivation. Women have been successful during the war in the cultivation of allotments, and, in many cases, have beaten the men, and there is no reason why girls should not be as successful as boys in the cultivation of School Gardens.

The flowers grown on the plots may be used for the decoration of the school rooms, and the girls will learn to arrange flowers in a light and graceful way which will be of great use to them in after life.

It is a good plan to grow a few roots of ordinary asparagus on a spare plot to provide foliage for the cut flowers.

Be careful not to overcrowd the flowers and do not try to grow too many sorts. Try to have a bed that is always in flower. Where the girls can get brier stocks, a standard rose might be placed in the middle of the bed, and a bush rose at two of the corners. The other corners might be used for clumps of Sweet Peas or Dahlias. Make use of Pinks, Violas, and Snapdragons. Coreopsis Grandiflora, or Lanceolata, will provide cut flowers throughout the summer.

CHAPTER II

Tools for the School Garden

THE Board of Education Regulations for a complete equipment of tools for 14 scholars include :

(*a*) Spades and forks—14 altogether.

The proportion of spades and forks should vary according to the character of the soil, e.g. more forks than spades where the land is exceptionally stiff.

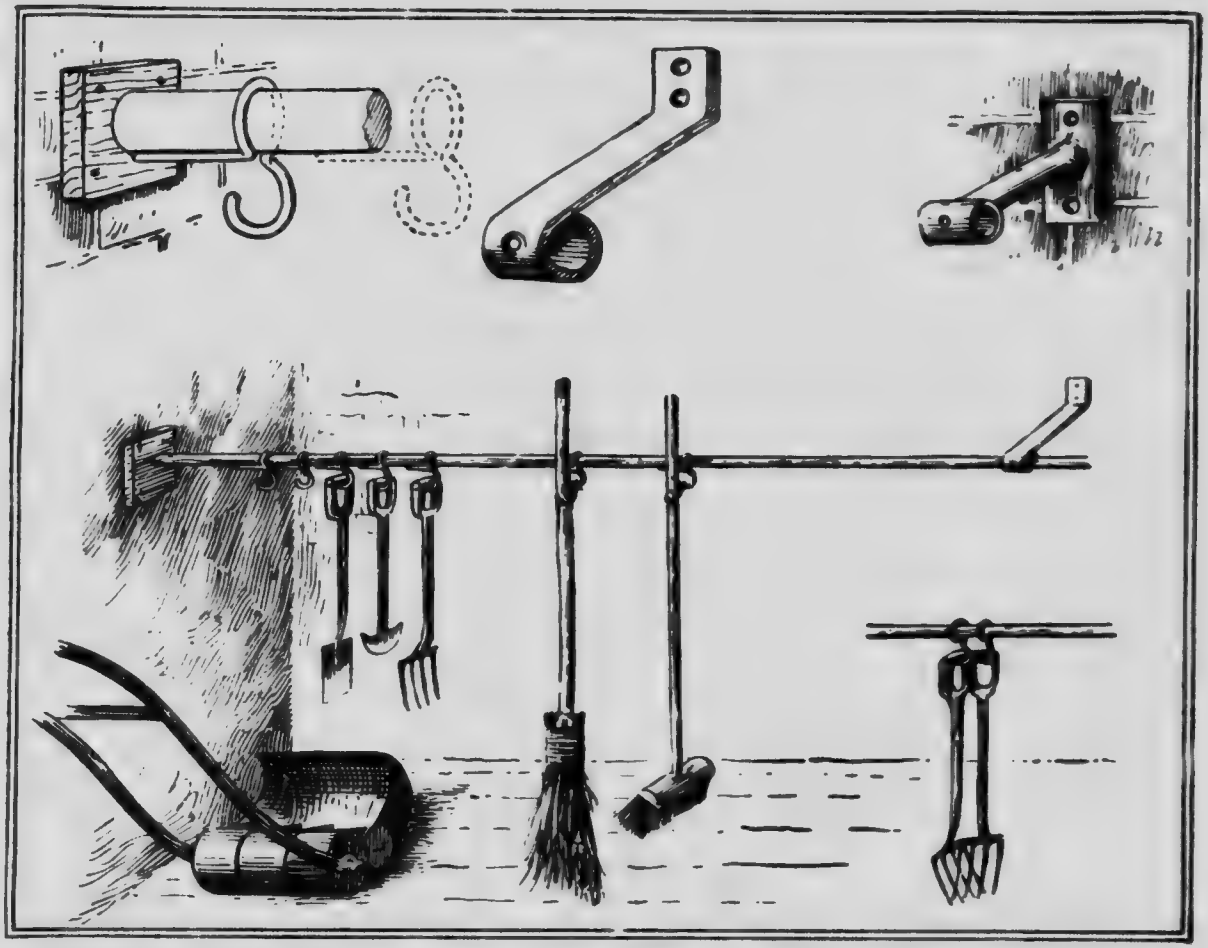
(*b*) Dutch and draw hoes—14 altogether, with 4 to 6 prong hoes.

(*c*) Rakes—4, trowels or weeding forks—7, a wheelbarrow, two or three watering cans, and several lines and dibbers (home-made).

For 14 scholars working on a common plot, somewhat fewer hoes, spades and forks would suffice, but not less than 8 spades and forks altogether, and not less than 6 Dutch and draw hoes altogether, should be provided. For fruit culture, pruning knives will be required, and a spray syringe. A glass frame is very useful, but not absolutely necessary. The initial cost of a set of tools is from £3 10s. to £5.

When purchasing tools it is far more economical to buy those made by reliable makers than cheap ones, though the first cost is greater.

Spades should have one face of hard steel and the other face of softer steel. With use, the softer steel



SUGGESTION FOR INTERIOR OF ALLOTMENT TOOL SHED. THE SKETCHES AT THE TOP SHOW DETAILS OF THE HOOKS AND SUPPORTS IN USE BELOW

will wear away the quicker, and the spade will always be sharp.

Purchase, if possible, hoes with a set of blades of different sizes. The blades can be fitted into sockets, and the different sizes can be used according to the distance between the rows.

All tools should be cleaned and oiled after use. If this is done they will be much easier to use and will last much longer.

Measuring-rods of strong wood, one inch square and one yard long, one for each plot, can be easily made by the pupils.

As all rows should run at right angles to the sides of the plot, a strongly made T-square will be very useful.

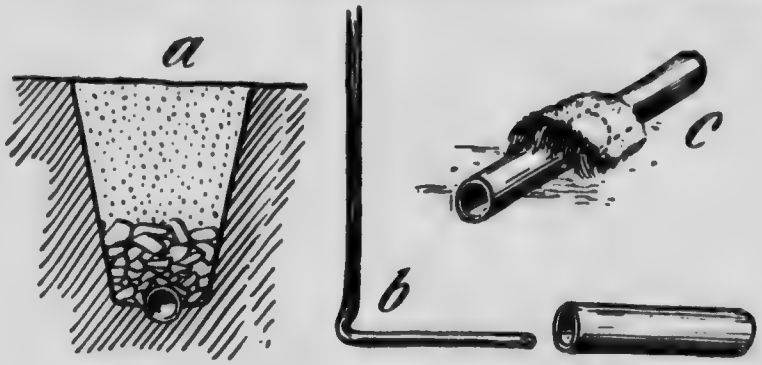
TOP SHOW DETAILS OF THE HOOKS AND SUPPORTS IN USE BELOW

CHAPTER III

Cultivation of the Soil

Drainage.

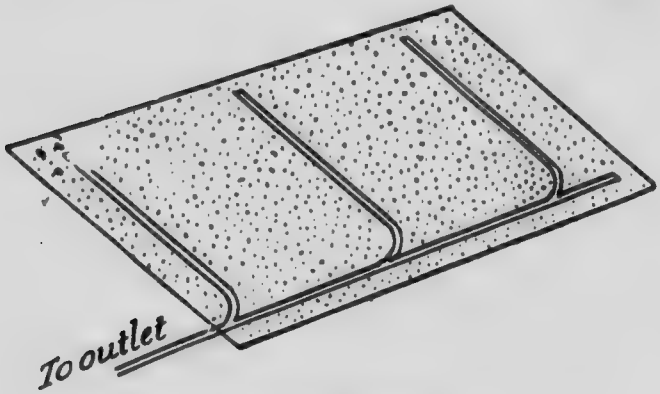
IN order to grow, the roots of plants require water, air and wamth. The water in the soil, to be beneficial to the plant, must be able to flow freely from place to place, and wherever water goes, air follows. Immerse a pot containing a plant in water. Air bubbles rise to the surface of the water, showing



a. **Drain covered in.** *b.* **Tool for laying pipes**
c. **Joint protected by turf**

that water is displacing air. Repeat this with the same pot three or four days later. Air bubbles will again rise, showing that in the meantime air has taken the place of the water which has drained out of the pot. Exactly the same thing takes place in the soil. Plants breathe through their roots as well as through their leaves. If the roots are surrounded with stagnant water the plants will be suffocated and

die. Nature supplies special plants for boggy places, e.g. you will always find rushes growing in wet soils. The first thing to be done is to see if the ground requires draining. Dig a hole 2½ feet deep. If water flows in and *stays* there, the soil requires draining. Waterlogged soil is always sour, and in a sour soil good garden crops cannot be raised. Test the soil with litmus paper. Press the paper on the damp soil.



Laying Drains

If the paper turns red the soil is sour. Drainage and lime will remedy this.

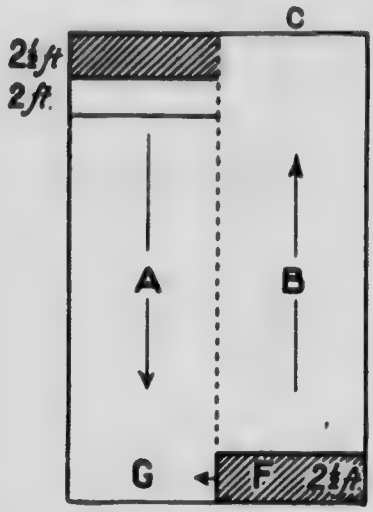
Draining Tool

Trenching, Digging and Ridging.

By digging is meant turning over the soil one spit deep, or to a depth of about 10 inches. Bastard trenching means loosening the soil two spits deep, and trenching, three spits. In the School Garden, the last method, especially in clay soils, will be found, as a rule, too heavy, and therefore bastard trenching is recommended.

If the land has been under grass, first pare off

the turf to a depth of about 2 inches, and stack it. Some gardeners place the turf, chopped up in small pieces, on the top of the subsoil, and then cover with the top spit, but as the turf is almost certain to contain wireworms, leatherjackets, and other forms of insect life injurious to plants, the former method is recommended. If fresh manure is plentiful, place a good layer alternately between the layers of turf, and the heat from the rotting manure will kill the greater part of the injurious insect life in the turf. Don't burn the turf. Next year it will be broken up small and dug in the soil where it alone will do as much good as a heavy dressing of farm-yard manure.



Plan of bastard trenching

Now run the garden line down the centre of the plot lengthways, and with a spade mark out a centre line. At one end of the half-plot, measure off 2½ feet. Dig out the top spit and place the soil at C. Now fork up the subsoil to the full depth of the fork, breaking it up well and mixing with it a good dressing of strawy manure, or any vegetable matter you can get.

It is not a good plan to leave the manure as a sandwich between the two spits. Now measure off 2 feet, dig, and throw this on the top of the broken-up subsoil. Don't break up the top spit, but leave it as rough as possible for the frost, air

and water to pulverise the soil. Break up the subsoil, and measure off another 2 feet. Repeat this till you come to the end of the half-plot A. Then take out a 2½-foot trench at F, and fill in the open trench at G. Continue and fill up the last trench with the soil at C.

Afterwards one-third of the plot should be bastard trenched each year, and as the soil is deepened, the crops will be increased. The top spit should be manured as well as the second spit.

Leave the subsoil at the bottom except in a few cases. Near towns the ground has been "made" as we say, i.e. it has been used as a dumping-ground for all kinds of materials, and the original soil has been covered. If, in trenching, this soil is reached, it should be brought to the top. In this case make a heap of the top spit at C, and another heap of the second spit beside it. Now throw the top spit of the second strip at the bottom of the trench, and then place the second spit on the top of this, thus bringing the undersoil to the top.

In this "made" ground all big stones must be removed, and placed in heaps. They will come in very useful for making paths between the plots. Don't worry about the smaller stones. They will do no harm. Mix up the soil as much as possible, and as the soil will most probably be poor give it plenty of manure. If there is any builder's rubbish in the ground spread it about well, and it will do a great deal of good. Pick out all weed roots and place them in a heap to rot. Burning gets rid of them quickly, but it wastes good plant food. After land of this description has been well cultivated it

produces splendid crops. Last year I saw some very fine crops of potatoes grown on land of this description.

Advantages of Trenching.

Trenching improves all classes of soil, if the subsoil, except in a few cases, is not brought to the top.

Clay soils are generally wet and cold; trenching drains them, makes them warmer, and so produces earlier crops.

Sandy soils are generally too dry. Trenching deepens the root run, and the plants are able to get water even in the hottest summer.

Later on we shall see that the soil is a plant food factory. Trenching extends this factory, and the greater the factory the more the work that can be done in it, and therefore we should expect better crops from trenched soil, and we get them.

Digging.

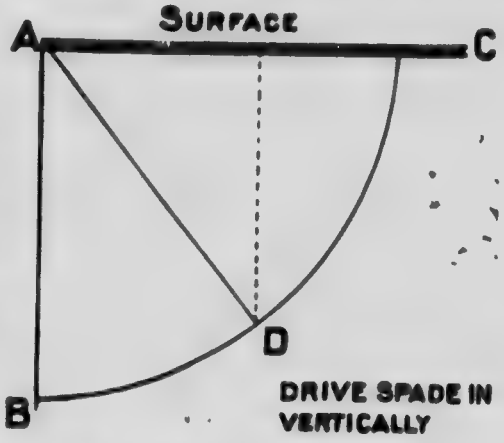
The object in digging is to expose the soil to the action of air, frost and water. All ground except sandy soil, should be dug in the autumn or early winter, and left rough so as to expose as large a surface of soil as possible.

On sandy ground the weeds may be allowed to grow (none will seed except chickweed) during the winter, and then the ground may be dug in the early spring.

Fither a spade or fork is used, but care must be taken to turn all the soil over. Drive the spade in vertically so as to get the soil moved to the full

depth of the spade. A glance at the diagram will show that this can only be done when the spade is driven in vertically. If AB and AD represent the blade of the spade (say 10 in.), B is 10 in. from the surface line AC, but D is less than 10 in. from C, and a well-dug garden will produce much larger crops than a ploughed field, chiefly because the ground is tilled to a greater depth in the garden.

Digging is hard work, but some people find it harder than others, because they do not use the spade properly. Just as in cricket we have right-handed and left-handed batsmen, so we have right-handed and left-handed diggers, but if we learn to dig both ways, we make the work easier.



A right-handed digger grasps the top of the handle with his right hand, and with his left he grasps the middle of the handle. Then placing his left foot on the left shoulder of the spade, he springs forward, throwing the whole weight of the body on the spade, and driving it into the soil to its full depth. Now, using the weight of his body as well as his muscles, he levers the spade to loosen the soil. This use of the weight of the body is most important, and, by helping the muscles, lessens the labour of digging. Now, slipping the left hand farther down the handle he lifts the soil, and, with a turn of the wrist, throws

the soil off the spade so that it falls inverted, i.e. the soil which was at the bottom is now at the top.

When commencing to dig take out a trench 18 in. wide, then dig right across the plot, taking thin slices. Keep a good trench all the time, and in it bury manure and weeds. Then if you have been digging right-handed, dig the opposite way left-handed. In this way you will first be using one set of muscles and then another, i.e. one set working while the other set is resting.

You will find it easier to dig if you face uphill.

Leave the soil rough.

d. Open trench
e. Spade cleaner

Ridging.

Ridging is strongly recommended where the soil is stiff, and is quite as easy as digging, but better, because it exposes a much larger surface to the action of the weather. Ridge clay soils in early winter.

Mark off the plots in strips 2½ ft. wide, and ridge one strip at a time. Take out a trench as in digging, and then go down the strip, throwing the soil into ridges. Then ridge the next strip the opposite way. When the plot is finished a series of ridges and hollows have been formed with a much larger surface than if it had been dug in the ordinary way. When ridging break up the soil as little as possible.

In the spring these ridges are thrown down as the whole plot is forked up. This must not be done in wet weather, or the soil will be consolidated gain, and will be harder to pulverise than if the

land had not been touched. Never in the spring work heavy ground when it is wet. When trenching or digging in late autumn or early winter, it is rather an advantage to work the ground when it is not too dry, as the wet causes it to hold together and so enables the digger to leave it in a rougher state.

Hoeing.

This is a far more important operation than many gardeners imagine, and has an extremely beneficial

Ridging

effect on crops. Well-hoed crops have been proved by experiment to yield nearly twice the produce of unhoed crops. Hoeing aerates the soil, and also, by forming a soil mulch, prevents excessive evaporation. This soil mulch should be at least two or three inches deep. Many gardeners hoe simply to destroy weeds, and by using a draw hoe, and walking over the ground, consolidate the soil again and so lose one of the great benefits of hoeing. Use a Dutch

hoe, walking backwards, or if you use a draw hoe, walk down an unhoed row by the side of the one you are hoeing. When you have nothing else to do, hoe, and as a gardener can always find some crop to hoe, he need never be idle. Hoeing pays always. Always hoe after rain, but wait till the surface is partly dry.

Action of Frost, Air and Water.

Frost, though often dreaded by the gardener, is one of his best friends. Many of our plants and vegetables are natives of warmer climes than ours. Frost treats these harshly, and many of them die at his touch.

It is by his action in breaking up the soil that Jack Frost is such a friend to the gardener. Water gets in between the particles of soil. Frost causes this water to turn into ice, but before the water turns into ice it expands or swells. This drives the little particles of soil apart so that they lose their cohesion, and when the ice melts the soil falls apart in very small particles. Examine lumps of soil after a frost, and the action of the frost will be plainly visible.

The expansive force of ice can be seen by filling a bottle with water, corking it tightly and leaving it outside on a frosty night. The next morning the bottle will be found broken.

Air.

Very few people know that a plant in order to live must have air, and that it breathes just as men and animals do. But besides the plant requiring air for breathing, air is also necessary in the preparation of plant food. In the soil there are immense numbers of

small organisms called bacteria. A handful of soil contains millions of them, and these are the workers in the soil factory. They prepare the food for the plant. This food undergoes several processes in its manufacture, and different bacteria do different kinds of work. The food passes through the "hands" of several kinds of workers before it is ready for the plant to absorb.

A bean growing.—1. Soaked seed. 2. Root appearing. 3. Arched stem before the seed-leaves rise up. 4. Seed-leaves open with shoots between. 5. Full-grown bean-plant

Plenty of air is necessary to enable these bacteria to work successfully. As a rule they work very near to the surface of the soil.

Air also oxidises some of the iron compounds found in the soil, and which, if they were not changed by the action of the air, would kill some of the roots of the plants. Everybody knows that we have to protect iron

by covering it with paint, otherwise it would, by the action of the air, rust.

In a similar way air acts on these injurious substances in the soil, changing them completely and rendering them harmless.

Water.

Plants are unable either to grow or live without water. As much as 75 % of some plants is water. All plant foods must be dissolved in water before they can be absorbed by the plant. It is therefore most important that plants should not suffer from lack of water.

The gardener has to trust to the rain chiefly for his water supply, but when he has got the water in this way he must take steps to keep it, and make the best use of it, and that is what the poor gardener does not do.

The gardener digs up his soil in the autumn to allow the water to get in. Dug soil is always wetter in spring than undug soil. If we get too much water the surplus is carried off by drainage. It is in the summer time that lack of water is felt, and the land dries quickly. We must take steps to prevent this rapid evaporation.

If you get six glass tubes, each with a different bore, and place them in a tumbler of water, you will find that in each case the water has risen higher than the water level in the tumbler. You will also find that the water stands at different heights in the different tubes. You will find that the water stands highest in the tube of the smallest bore. Something has caused the water to rise. This is a force which is called capillary attraction, and it is this force which causes the sponge

to hold water, and blotting paper to absorb ink. Place a piece of chalk upright in an inkwell, and you will see what happens. Now, in the soil, the particles are arranged like the particles in the chalk, and water rises in a similar manner as the ink did. When the water arrives at the surface it evaporates or dries up, just as the water dries up on the pavement after a shower. If this evaporation at the surface is allowed to go on, the soil will naturally get drier and drier, and our water supply will get less and less. Now this capillary attraction can only act in very small spaces. By the use of the hoe the surface of the soil can be loosened, the particles of soil broken apart, and then the capillary force ceases to act. The water is thus unable to reach the surface of the ground, and this evaporation is stopped.

Another way of preventing evaporation is by mulching the soil to a depth of 2 or 3 inches with a layer of short manure or lawn mowings.

Where soil easily dries out the ground must be supplied with plenty of animal manure (cow and pig manure are best). The humus formed from this manure retains moisture much better than soil, and acts as a reservoir, so that ground so supplied does not dry out.

Trenching the ground is especially useful on light soils, as the roots can go to a good depth for their water, and surface evaporation is not so severely felt.

Watering.

A leading horticulturist said when he was lecturing to a large body of allotment holders: "If you have a watering can, sell it and buy a hoe."

That is the spirit which should guide us in the use of the watering can. Don't use it if you can avoid it.

Small seedlings have small roots and watering must be done when the surface dries, but never give water in driblets. Remember an inch of rain means between four and five gallons per square yard.

The amateur gardener watering his plants through a hose generally just damps the surface. A slight disturbance of the soil will show that the water has penetrated about $\frac{1}{8}$ inch. This is worse than useless. Surface watering encourages the roots to come to the surface. The surface dries and the root hairs die. Roots should be encouraged to go downwards, therefore, when watering, either give the land a good drenching or leave watering alone. Seedlings must be watered, but if large plants are watered, don't use the rose.

After watering, and when the ground has dried a little, the surface should be hoed.

A very good plan, and one that carries the water well down, is to sink flower pots in the soil up to the rims and pour the water into them. This not only prevents the roots being attracted to the surface, but it also prevents that hardening and cracking of the soil which always follows watering when it is done in the ordinary way.

The Soil Factory.

The soil is that part of the earth's surface which is occupied by the roots of plants.

It is rock-crumbled by the action of frost, water and air. Gardeners must never forget that these three are still at work and ready to help them to bring their soil to that fine tilth which the roots of plants love. Under this soil, which varies in depth, is the subsoil, which is generally very different from the soil, both in colour

and texture, and very often contains materials which are injurious to plant life. If this subsoil is exposed to the air, the poisonous substances will be oxidised, changed, and lose their poisonous properties, and perhaps some will be turned into plant food.

An old quarry will show the soil and the subsoil, and produce evidence of the crumbling of rocks by the action of frost, air and water.

Soil generally is darker than the subsoil. This is due mostly to the presence of humus, or decaying animal and vegetable matter, e.g. dead roots, leaves, etc. The greater the amount of humus in the soil, the more fertile will the soil be as a rule. It is the presence of this decayed vegetable matter that makes the prairie lands of Manitoba produce year after year fine crops of wheat without plant food being added to the land in the form of manure.

If we add decaying vegetable and animal matter to the subsoil, and also expose it to the action of the air, we make it fertile also, and thus deepen the soil.

Soil differs in character, and this is due to the different kinds of rocks from which they have been made. Slaty rocks give clay soils, sandstone gives sandy soils, while chalk gives limy or chalky soils.

Soil generally is a mixture of clay and sand, and is heavy or light according to the proportion in which these materials exist.

Heavy soil retains moisture, and is generally difficult to work. The clay is divided into very fine particles which are very much smaller than grains of sand. The small particles pack themselves very closely together so that water has very great difficulty in passing between them. It will easily be understood that the

larger the particles of any material, the larger will be the spaces between the particles. Two flower pots of the same size are filled, one with fine sand, and the other with coarse sand. Water is poured on the sand in both pots. It will be found that the water passes much quicker through the coarse sand than it does through the fine sand.

Lime added to clay soil causes the small particles of clay to join together, and therefore lime added to clay soil causes water to pass more readily through it. If water is added to clay in a glass vessel, and stirred, the water will become clouded, and even on the next day the water will not be clear. There will still be fine particles of clay floating about in it. If lime water be added it will cause the small particles of clay to join. They become heavier, fall to the bottom, and the water clears.

Sandy soil, on the other hand, will not retain moisture, and the difficulty is, in this case, to provide moisture in quantities sufficient for the demands of the plant.

Clay soils give late but generally good crops, while sandy soils give earlier but less abundant crops. The skill of the gardener will cause him to add such materials to his land that no matter what soil he has to deal with he will improve it.

Anything of a gritty nature, such as road-sweepings (avoid those from granite or tarred roads), burnt earth, and strawy manure will improved clays oils, while sandy soils can be improved by the addition of clay or marl. If either of these materials can be obtained it should be spread thinly on the surface of the sandy soil, allowed to stay there all through the winter to be pulverised by the weather and dug in in the spring.

An ideal soil is a mixture of clay and sand, called loam, which is workable for the greater part of the year.

The soil is partly mineral (inorganic), and partly vegetable or animal (organic), the latter having been added to the soil by some means. It is on this organic part of the soil that its fertility depends. For this reason alluvial soil, i.e. soil deposited by action of water, is generally very fertile owing to the presence in it of large quantities of decaying vegetable matter.

The inorganic, or mineral, part of the soil contains very little material that can be used for plant food. The great bulk of the plant food has to be obtained from outside, and therefore the soil proper is really the storehouse and the factory where vegetable or animal (organic) matter can be turned into plant food. This plant food which is added to the mineral part of the soil is known as manure, and this manure is returned again and again to the soil. The plant is built up largely from materials obtained from the soil. Either the plant dies, rots, and returns to the soil, or the plant is eaten by animals, which return part of the plant material to the earth in the form of excreta, and the other part they use to build up their bodies. These die eventually and the whole of the plant material is returned again to the soil. This material moves in the nature of a circle. First it is in the earth, then in the plant, then in the animal, and then back to the earth.

Plants have been analysed in order to see what materials are used in their construction. These substances are (1) hydrogen, (2) oxygen, (3) nitrogen, (4) carbon, (5) sulphur, (6) potash, (7) phosphorus, (8) iron, (9) magnesia, and (10) lime. Other substances are

found sometimes in plants, but they are not really necessary and plants will grow without them, but plants will not grow if any one of the ten substances named is absent. Whichever is absent, that one must be added to the soil before the plant can grow satisfactorily.

Most are present in all soils. Hydrogen and oxygen are obtained from water, and carbon, which is not soluble in water, and therefore cannot be taken up by the roots, is obtained through the leaves from the air.

The soil is generally deficient in three substances required by plants, viz. nitrogen, phosphorus and potash, and these three form the basis of all complete manures.

All the other substances are found in the soil in quantities sufficient for the needs of plants except lime, which is very important and has a chapter to itself. Iron, which is necessary for the formation of chlorophyll, or the green matter in plants, and magnesia are very occasionally not present in sufficient quantities. If when soil is burnt it turns the colour of iron rust, there is plenty of iron in the soil, but if the burnt soil is white, sulphate of iron should be added to the soil at the rate of one or two pounds per square rod.

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CHAPTER IV

Manures

MANURES are spoken of as either natural or artificial. Manuring in ancient times meant tilling the ground. This improved the conditions of the soil, and encouraged plants to grow. Anything therefore added to the ground which will improve the condition of the soil is a manure.

Farmyard Manure.

This is the oldest and safest of all manures. It not only provides food, but it also supplies the soil with humus, and improves its condition, rendering clay soils porous and helping sandy soils to retain moisture. As it dissolves slowly its benefits are lasting. It is the excreta, both solid and liquid, of animals mixed with litter. This excreta, whether dung or urine, is of vegetable origin, and is made up of the materials taken into the body as a food. It is a complete fertiliser as it contains nitrates, phosphates and potash. The urine is of more value as a plant food than the dung. About four-fifths of a ton of manure is water, and not quite one-fifth solids.

When farmyard manure is placed in a heap it ferments and becomes hot. This heat the gardener uses in the hot bed. While fermentation is going on the manure, owing to the work of minute bacteria, is changing and becoming soluble, and often a dark liquid runs

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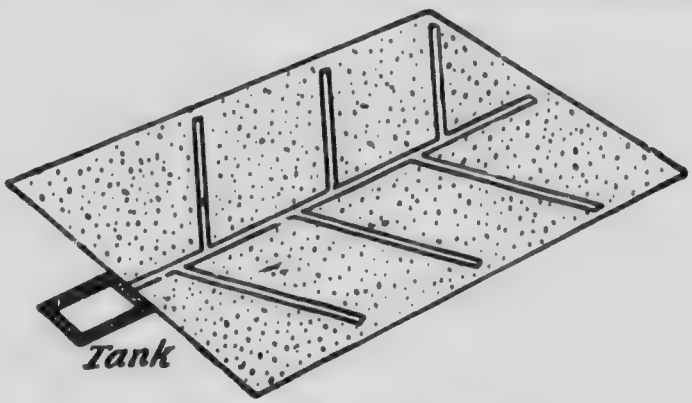
away from the manure heap. Two things must be prevented while this fermentation is taking place or the manure will lose the greater part of its value. First, we must protect the soluble matter from being washed away by the rain, and, secondly, we must prevent the heap from becoming overheated, or nitrogen in the form of ammonia will be given off, and a very valuable part of the manure will be lost. The first we can prevent by



Cemented base for manure

stacking the manure somewhat like a farmer makes a rick, and the second may be prevented by keeping the heap moist and treading it firmly.

The manure heap should be placed on a hard bottom, and care should be taken to preserve the liquid that runs from the manure heap. In Craven Park School Garden the ground on which the heap stands is cemented and the liquid runs into a cemented basin.

The liquid can either be poured over the manure heap, or it can be used as a liquid manure. Before applying it to the land it must be watered down until it looks like weak tea.

The character of farmyard manure varies according

to the kind of animal from which it is obtained, and also with the character of the food with which the animal has been fed, and the richer the food the better is the manure. Thus the manure obtained from horses fed on dry food, i.e. hay and corn, is better than that obtained from horses fed on green food. The character of the litter used also makes a difference.

Horse manure is hot, coarse and dry, and is therefore suitable for clay soil. Pig and cow manures are cold, close and wet, and suit sandy soil. Poultry manure is one of the richest of manures and should be used with care. It should be kept dry and not used when fresh. A layer should be placed in a box, sprinkled with lime, and then covered with a thin layer of soil. This should be repeated till the box is full. After passing the manure through a sieve, sprinkle it over the ground at the rate of 4 oz. to the square yard. As a manure heap is not ornamental it should be screened by a hedge of shrubs.

Green Manures.

There will be greater and greater difficulty in obtaining manure in towns, as the horse is gradually being supplanted by the motor. As this manure furnishes the humus which is necessary if soil is to be fertile, we must find a substitute for it, and so provide the necessary humus. This can be done by green manures. Vacant land should be sown with mustard or rape seed. Both these seeds grow very rapidly, and the plants should be dug when they are 6 inches high. If the land is going to be vacant long, sow vetches or rye. Should the crop get too tall for digging in easily skim off the top of the soil, place the green stuff at the bottom of the trench, and bury it by turning the next spit over it.

In connection with this method of supplying humus and plant food to the soil, it would be well to consider the advisability of planting second early potatoes such as "Great Scot" and "British Queen" in preference to late potatoes. They may be lifted in late August or early September and so give an opportunity of growing a green crop.

The Compost Heap.

There should be a compost heap in every garden. Any vegetable matter like weeds, thinnings, leaves of any sort, grass, couch grass, etc. should be placed in heaps to decay. Each layer should be sprinkled with lime, covered with soil, and added to from time to time. Anything of a woody nature, such as prunings of trees, and shrubs, or anything likely to contain germs of disease like cabbage stalks, and potato, pea and bean haulms should be burnt. The ashes should be kept dry. They contain potash and are very valuable.

The materials in the compost heap will take some time to decay. When decay has taken place the material should be passed through a sieve, and spread thinly over the ground.

If spent hops from a brewery can be obtained they may be dug into the soil. They have little, if any, manurial value, but they will provide humus and be useful to any class of soil.

Artificial Manures or Fertilisers.

The difficulty of obtaining ordinary manure will compel greater use of artificial fertilisers. There is not much doubt that better crops can be obtained by

using both kinds than can be raised by the use of one kind alone. Greater attention will be given to the use and provision of artificial manures in the future than has been the case in the past. Science will come more and more to the aid of the farmer and the gardener, telling them the best way and the best kinds of fertilisers to use for different crops. The prejudice against their use which now exists will pass away as the benefits from their use are gradually appreciated.

Artificial is not a good description of these manures, as some are of animal origin like bones and blood, others like nitrate of soda and kainit are found in deposits in the ground, guano (the Spanish name for dung) is the dung of sea birds, while sulphate of ammonia is a by-product of gas works.

When using these manures it is best to apply them separately as it is almost impossible to mix them thoroughly. Be careful not to dust them over the leaves and stems of plants or you will injure the plants.

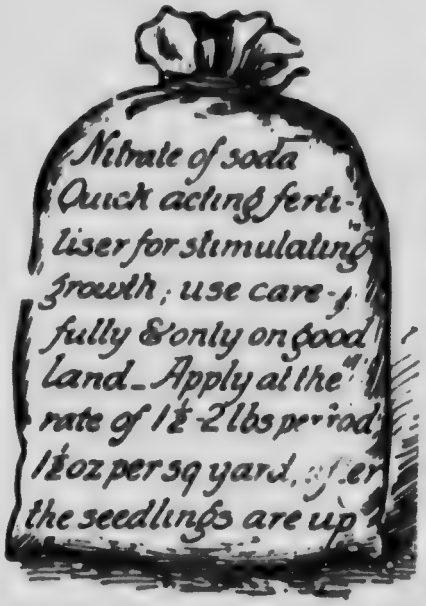
Some, like nitrate of soda, dissolve in water as easily as sugar, while others like bones dissolve very slowly.

For convenience we will divide artificial manures into three classes—nitrates, phosphates and potash. There are so many different kinds that only the commonest can be dealt with here.

Nitrates—Nitrate of Soda, Sulphate of Ammonia.

These should be applied at the rate of 1 lb. per rod, or as a liquid manure at the rate of ½ oz. per gallon. They should be applied to growing crops

in the spring and early summer as they are very soluble and are easily washed out of the soil. They give vigour to the plant. If the leaves are yellowish or light green in colour the plants are almost certain to require nitrogen. In a cold spring, wheat crops often turn yellow. This is due to the fact that the nitrifying bacteria are unable, owing to cold, to do their work of supplying the plants with the nitrogen they require.



Nitrogen is especially good for leaf crops like cabbage, celery and lettuce.

Soot too, contains nitrogen. Mix a little lime and soot together, and ammonia is given off. We often mix soot and lime together to prevent the attacks of insect pests and slugs, but we should never do so when we are using soot as manure.

Soot should not be dusted over plants when it is fresh, or it will burn the leaves. It should be kept dry for a time.

Soot is not only very useful as a manure, and for dusting over seedlings to protect them against slugs and insect pests, but it also makes the ground warmer by darkening the soil. The darker the soil, the more sun-heat that soil will absorb. Get two thermometers, blacken the bulb of one, and place them both in the sun. Note what happens.

Nitrate of soda is generally used on light soils, and sulphate of ammonia on heavy soils. As the latter is an acid manure the soil on which it is used must contain lime or the manure will do very little good.

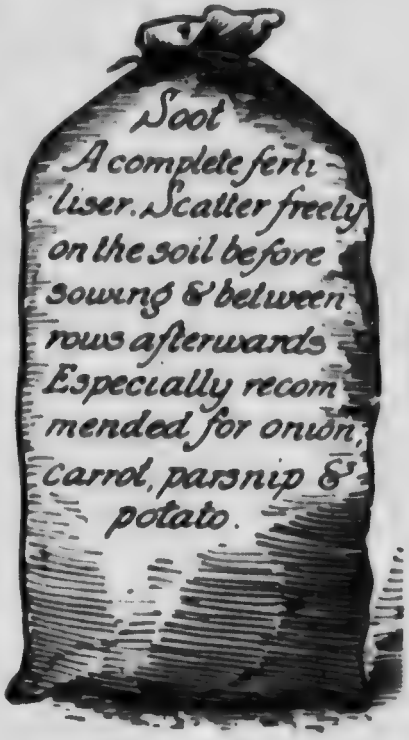
Phosphates—Superphosphate of Lime; Basic Slag.

The former is best for light soils and the latter for heavy soils.

Dig in the former, 3 lb. per rod, in the spring, and the latter 4 oz. per square yard, in the autumn, or early winter, as it dissolves slowly.

Superphosphate is an acid manure, and therefore lime should be present in the soil on which it is used.

Basic slag supplies not only phosphate to the soil, but also lime. It is a by-product of the steel manufacture. No one need be afraid of using it on heavy soil. Good effects will certainly follow.



If the cabbage does not heart, and the turnip or onion does not bulb, phosphates are deficient in the soil.

Potash.

This form of manure is very valuable for use in potato and pea crops. It is also valuable for fruit trees.

The chief forms of this manure are sulphate of

potash (1 lb. per rod), muriate of potash (1 lb.) and kainit (5 lb.).

Formerly we obtained nearly all our potash from Germany. Now it is exceedingly satisfactory to know that we shall be able to get all the potash we need from home production.

A complete fertiliser can be obtained only by using the three classes of manure.

The Board of Agriculture recommend 3 lb. of superphosphate and 1 lb. of sulphate of ammonia per rod; 1 lb. of sulphate of potash may be added to these.

Wood ashes, especially that obtained from burning green twigs, contain a small amount of potash.

When buying artificial manures insist on being supplied with an analysis.

Lime.

To be a good gardener, one must realise the value of lime or chalk in the soil. A well-known gardener giving a lecture said he had come there to preach the gospel of lime.

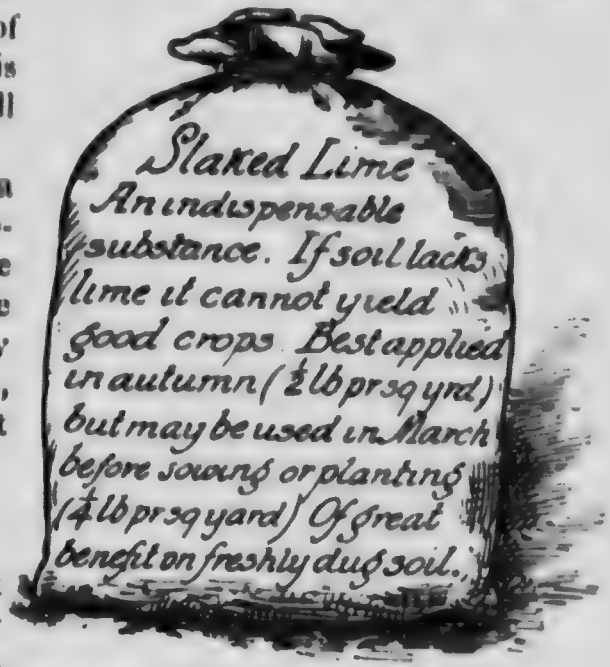
To find out whether there is sufficient lime in the soil, take a mixture of soil from different parts of the garden, put the soil in a tumbler, add water, and stir up. Now add a few drops of hydrochloric acid (spirits of salt), which can be obtained at an oil shop or from a chemist. If the mixture effervesces well, there is plenty of lime in the soil. If there is little or no fizzing, then lime in some form must be added.

Clay Soil.

For clay soil half a bushel will be required for each rod. If the lime is well ground not quite so much is

needed. Should the lime be in lumps, put it on the ground in heaps, cover it with soil, and leave it for a few days. The lime will slake and fall to powder. Spread it evenly over the ground, and fork it in. This must be done at least three weeks before seed is sown.

Lime must not be mixed with manure or soot as it sets free the nitrogen in the form of ammonia, and this valuable food will escape into the air.



February is a good time for applying lime. The dressing should be repeated every three or four years, as lime washes out of the soil.

Sandy Soil.

Lime must not be used for sandy soil as it burns up the humus. Apply one bushel of chalk per rod instead. Spread the lumps of chalk over the surface for the frost to pulverise. Lumps will do no good.

Lime has many things to do in the soil. Soil is often sour. This is due to the presence of acids, formed by the decomposition or rotting of humus, or to stagnant water. Lime neutralises these acids. Acids are formed in the plants themselves. Lime is taken up by the plants, and this acid is neutralised. Old garden soil is

often acid owing to the abundant manure which has been dug in year after year. A good dressing of lime in such cases works wonders.

Lime makes clay soils porous, and therefore makes them easier to work. Place a little clay in water, stir it up well, and the water becomes muddy. Let it stand for some time. The heavier particles will sink to the bottom, but even after 24 hours the water will still be cloudy. This is caused by the water holding up very fine particles of clay. Add a little lime water, and the muddy appearance disappears. The lime has caused the little particles to join and form particles too big for the water to hold up. The larger the particles in the soil the larger are the spaces between them. In this way lime causes clay to become more porous.

Lime exists in the ground as chalk, and chalk is one of the best water absorbents. Thus lime or chalk benefits every kind of soil in some way.

It is of no use to apply artificial fertilisers to soils unless lime is present. Many of the commonly used fertilisers are acid, and if these are applied without lime being present do more harm than good, and in the end would cause the soil to become sterile. Plants will not grow in acid soils, or rather the plants we want in a garden will not.

Lime is also required by the bacteria to enable them to prepare abundance of food for the plants, and unless the plants are well supplied with food, they cannot grow in such a way as will bring joy to the gardener's heart.

Clay soil contains potash, but this is locked up in the soil in such a way that plants are unable to use it. Lime sets it free and thus gives to the plants a most valuable food.

Weeds.

A weed is a plant growing where it is not wanted. Thus a potato growing up in an onion bed is not wanted, and for the time being is a weed and must be rooted out. Weeds rob plants of food, air and light. There is only one punish ment for these robbers and that is—death. The hoe will get rid of most of them (gather them up in damp weather or they will take fresh root), but those in the rows must be pulled up by hand. They must *not* be allowed to seed—"one year's seeding, seven years' weeding." There is another danger in allowing weeds to grow. Weeds are often attacked by insects and diseases which attack plants. They may therefore be the means of causing garden plants to suffer either from insect pests or disease. The dock is attacked by the dolphin fly. Thus docks should not be allowed to grow where broad beans are (nor anywhere else). The charlock is attacked by the club-root or finger-and-toe disease, and may thus infect soil with the germs of that disease and render it unfit for the growth of cabbages.

Weeds are either annuals or perennials. Annuals are easily killed, but perennials which have fleshy roots cannot easily be killed, though they may be weakened by the use of the hoe. To cut off their tops is but to imprison them for a time. They will soon be out again. Death, remember, is the only penalty. Dig these perennial weeds out.

The chief weeds must be known and recognised. Couch grass or twitch has jointed underground stems. Each little bit of twitch left in the ground

will grow. Above ground it can easily be mistaken for innocent grass. In some soils it grows very fast and its sharp growing points will pierce almost anything. It must be got out, but don't burn it. Turn it into use by putting it on the compost heap.

Thistles, bellbind (wild convolvulus), docks and nettles must all be dug out.

On sandy soils annual weeds may be left to grow during the winter. None will seed except perhaps chickweed. They can then be dug into the ground in the spring and thus form a green manure.

Transpiration of Water.

In the previous chapter we have seen that plants breathe through the leaves, and take up food dissolved in water through the roots. It requires a great amount of water to dissolve the food that the plants require. What becomes of this water after it is taken into the plant? Some of it is used to build up the plant, but not all of it. If a bell-jar is placed on the ground in the sunshine it soon becomes dimmed with moisture, which we know evaporates from the soil. Now place a bell-jar over a plant, but first cover the ground with a mackintosh sheet. Tie the sheet firmly round the stem. Now you will notice that again the glass becomes dimmed, and after a time water will begin to trickle down the inside of the jar. This water has not come from the ground which has been covered by the mackintosh sheet. It must have come from the plant. Plants are like men and animals—they breathe out water. The amount of water breathed

out by plants is enormous. It is estimated that from three to four hundred tons of water are transpired, during its growth, from the grass that is required for one ton of meadow hay. It is owing to this transpiration of water that newly planted plants wilt, as do cabbages in the hot summer sunshine when suffering from the club disease. In both cases the leaves breathe out water faster than the roots can supply it. If you plant in hot weather, cover the plants with flower pots, or shade them in some way to prevent rapid evaporation.

Transpiration prevents leaves from getting too hot. Before the water leaves the plant it must turn into vapour. and when liquids evaporate they always take up heat. If you pour Eau-de-Cologne or methylated spirit on the hand it quickly evaporates, and the hand feels cold, because the liquid in evaporating has taken away heat from the hand. In the same way the water takes heat from the leaves, and keeps on doing so all day, and thus leaves are kept cool.

Rotation of Crops.

Different kinds of crops, like different kinds of animals, require different kinds of food. We may divide plants into (*a*) fibrous-rooted or leaf plants like cabbages, peas, etc., (*b*) tap-rooted plants like carrots and parsnips, and (*c*) tuberous-rooted plants like potatoes. Each kind of plant exhausts the soil by taking out the food it iikes best. We allow some time to elapse before planting the same kind of plant, so giving the soil a chance to store up a good supply of this food again. Thus the farmer does not grow wheat year after year on the same field, but grows

a different crop. He may grow crops in this order—wheat, roots, barley, clover, and then begin again. This is called "rotation of crops." This not only keeps the land fertile, but it also helps to prevent loss from insect pests and disease.

It is much easier to follow this rotation of crops on a farm than it is in the garden, because in a garden we grow so many "catch" crops, but we can try to follow a rotation as closely as possible.

YEAR	1ST	2ND	3RD
1	Potatoes moderately manured.	F	T
2	Fibrous rooted Well manured. Trenched.	T	P
3	Tap rooted No manure Dig deeply.	P	F

Three year rotation of crops

Divide the plot into three parts, as per plan 1, 2, 3, which shows how the plot will be cropped for three years, and in this way we get a three-year course of rotation.

Plant No. 1 with potatoes (P), giving two barrow-loads of manure per rod.

Plant No. 2 with fibrous-rooted plants (F), bastard trench the plot marked F each year, and give three or four barrow-loads of manure. If this plan is followed the whole plot will be bastard trenched every three years.

Plant No. 3 with tap-rooted plants (T) and give no fresh manure or the tap roots will be forked. As tap-rooted plants follow the fibrous-rooted plants they will benefit from the manure which had been plentifully supplied to the plot during the preceding year.

CHAPTER V

The Growth of Plants

A PLANT has generally three parts—the root, the stem and the leaves. Each plant is a factory which takes the food prepared in the soil, and the carbon extracted from the air, and turns them into that material which builds up the plant and thus enables it to grow.

The Roots.

The roots do two things. They are anchors to keep the plant in its place, and they are the mouths through which it obtains its food from the soil. The strong roots are the anchors.

The roots throw out branches that divide and subdivide. The smaller roots have still finer divisions called root hairs, and it is these that take up the plant food from the soil. The tip of each root hair is protected by a shield, and the hairs are hollow. Before the food can enter it must be dissolved in water, and then by a process called osmosis it passes into the root hair. It is carried by capillary attraction up the stem and into the leaves. Sometimes the roots themselves take part in dissolving the food by secreting acid. A piece of flannel is stretched over a polished piece of marble, and is kept damp. Mustard is sown on the flannel. After a time the mustard is cut and the flannel is removed from the marble. If the marble is examined it will be found

that the surface of the marble has been marked by the roots. The acid from the roots has eaten into the marble.

The Stem.

The stem and its branches carry the leaves and hold them up to the light. The plant food passes up the stem to the leaves and down again to the roots. This is the sap or blood of the plant.

The Leaves.

It is in the leaves of the plant that its factory is situated, and therefore the leaves are a very important part of the plant. If a leaf is cut across transversely, and the thin edge examined under a microscope, little cells, in shape like the cells of a honeycomb, will be seen at the outer parts of the leaf. Most of these cells are green. The green matter is called chlorophyl (Klor-o-fil). Iron must be present in the plant food to enable the plant to make this green matter, nor can it be formed without the help of light. On the under surface of the leaves are found little openings called stomata. These are the nostrils of the plant, and through them the plants breathe or take in air. The air is mainly nitrogen (four-fifths) and oxygen (one-fifth), but there is also a small amount of carbonic acid gas (CO_2) or carbon di-oxide. This consists of carbon (1 part) and oxygen (2 parts). Water is brought up from the roots through the veins of the leaves into the little cells. The air passes through the walls of the cells and mixes with the water much in the same way as the air taken into the lungs mixes with the blood. Water is H_2O, i.e. hydrogen 2 parts and

oxygen 1 part. Carbon, hydrogen and part of the oxygen join together to make sugar. The part of the oxygen which is not wanted is breathed out into the air, and thus plants help to purify the air by ridding it of CO_2 which is harmful to animals.

The manufacture of sugar takes place in the green cells, and it is sunlight acting on the cells that does the work.

There is more carbon in a plant than any other substance except water, and all this carbon enters the plant by the leaves. Carbon is insoluble, and therefore cannot enter the plants by its roots. Think of the coal which has been obtained from the air by means of the leaves. Note, therefore, how important the leaves are. The carbon could not be used in the plant if light could not get to the leaves. Therefore give plants plenty of light, and do not overcrowd them.

Sugar is only carbon and water. It is the carbon that makes the sugar solid, and it is the carbon that forms solid woody substance.

Presently the sugar in the leaves changes into starch, and this starch passes down the stem to be stored for future use by the plant, either in tubers, tap roots or seeds.

Sometimes a small potato will be found growing on the stem of a potato plant. If the stem be examined it will be seen that it has been injured in some way, most likely by an insect or caterpillar. This injury has prevented the starch from passing down to the roots, and it has been used to form the little potato on the stem.

The plant intends to use this food store to reproduce

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itself, but man acts the part of the robber and seizes it for his own use.

If the leaves of a plant be tested for starch with a solution of iodine, the presence of starch will be shown by little spots of blue or black. The starch will be present only in the green portion of the leaf. None will be found in the lighter portion of a variegated leaf, and none will be found in any part of the leaf if the plant has been standing for some time in the dark. This proves that both green and light cells are necessary for the manufacture of starch. Plants try to get light to enable them to grow, and a little thought will enable us to understand why weak-stemmed plants climb, why leaves are arranged in certain ways on plants, why window plants become lopsided, and why it is better to plant rows in the garden so that they run north and south.

In the leaves of plants like beetroot there is plenty of green colouring matter, but it is hidden.

CHAPTER VI

Formation of Seed

THE aim of every plant is to reproduce itself, and for this reason nearly every plant produces seed, though some plants, e.g. ferns, reproduce themselves by spores. You may plainly see these spores on the back of fern leaves. These plants do not flower.

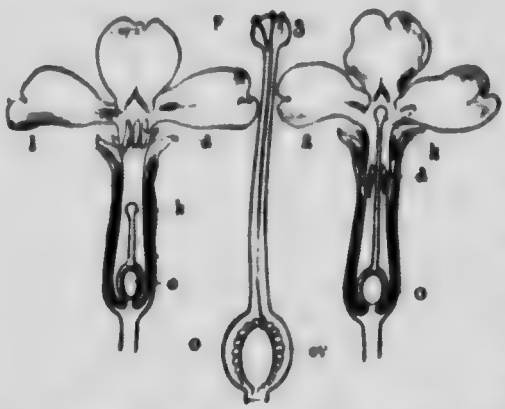
A plant produces flowers for the purpose of producing seeds, and for this purpose only.

If we examine a flower (a large lily is perhaps best, because every part of the flower can easily be seen) we find that it consists of several parts—corolla (petals), calyx (sepals), stamens (with anthers) and pistil. To the gardener the corolla, made up of bright-coloured petals, is the part of the flower of which he thinks most, and his great object in producing new varieties of flowers is producing finer and better-coloured petals. To the plant the corolla is the *least* important part of the flower. In fact, on the flowers of many plants the corolla is hardly seen, if it exists at all.

In the centre of the flower we generally find the pistil. At the top of this we find a knob, the stigma, which becomes sticky, and the hollow tube (the style) leads down to the ovary or seed-box, which in many cases becomes the fruit later on.

Round the pistil are arranged stamens which carry anthers on which will be found the pollen or flower dust.

To form seed this pollen must be carried in some way to the stigma, which at the proper time becomes sticky. This fertilises the plant, and seeds are formed in the ovary. The pollen is carried to the stigma either by insects or by the wind. Where the pollen is carried to the stigma by insects, the flowers have brightly coloured petals to attract the insect, and at the bottom of the corolla is a sweet substance called nectar from which the bees make honey. The sweet smell of the flowers and the nectar attracts insects which have to enter the flower to obtain the nectar. They become covered with the pollen (flower dust) which they carry from flower to flower, and some of the pollen is left on the sticky stigma and so fertilisation takes place. It is found that when flowers are fertilised with pollen from other plants of the same species more seeds are formed than when they are fertilised by their own pollen. Some fruit trees cannot be fertilised by their own pollen, and will bear no fruit unless pollen can be obtained from another tree of the same kind, but of another variety. The gardener for this reason plants Worcester Pearmain (apple) near Cox's Orange Pippin



1. Flower with anthers (*a*) high up and sticky knob (*k*) in the tube. 2. Flower with anthers (*a*) in the tube and knob (*k*) high up. (*o*) ovary. 3. Ovary (*o*) with ovules (*ov*) and pollen (*p*) growing down to them

(apple) so that the latter may be fertilised by the pollen from the former.

On some plants, e.g. vegetable marrows, one flower carries the stamens, anthers and pollen, and another flower carries the pistil and ovary. The former is called the male flower, and the latter, which is followed by fruit, is called the female flower.

When fertilisation has taken place the petals fall because they have done their work. When two flowers open together cut out the pistil of one and note what happens. At first the ovary is green, but gradually the seeds ripen. Note the steps that Nature takes to scatter the seeds. In some cases the ovary bursts suddenly, and the seeds are scattered far and wide; in other cases, e.g. thistles, the seeds have a kind of parachute, and are carried by the wind; while in others, e.g. burrs, the seeds have little hooks on them and are carried about by animals. Again the seed-boxes are sometimes covered with a bright-coloured fleshy substance, e.g. hips and haws, which are devoured by birds. The hard seeds pass through their bodies and in this way are widely scattered.

Dandelion seeds. — A. Ready for dispersal by wind

Propagation by Seeds.

Most vegetables are propagated from seeds. To enable them to grow, seeds require warmth, water and

air, and if any one of these is wanting then the seeds will not grow or germinate.

Soak a bean in water. It becomes soft because it has absorbed water, and the skin easily comes off. The bean can then be divided into two parts. These are the seed leaves which contain food to keep the baby plant alive and to enable it to grow (i.e. to build itself up) till it forms roots and leaves to feed itself. Between the

Vegetable marrow flowers.—1. Male flower with anthers. 2. Female flower with marrow and its sticky stigma

seed leaves may be seen the germ, which is the small living plant. While the seed is kept dry this germ sleeps, but when water and heat are applied to the seed it commences to grow just as the germ in an egg grows into a chicken when the egg is kept warm; and as the chicken is built up by the material which is inside the egg, so the young plant is built up by the material inside the seed till it is able to provide itself with food from outside.

If the seed is kept for some years this germ dies, the time varying with different seeds; but all seeds grad-

ually lose their vitality, and therefore, as a general rule, it is best to sow new seeds. Old seed always takes longer to germinate than new seed, but it need not be thrown away if it is tested before it is sown. To do this damp a piece of flannel and put it on a plate. Scatter 25, 50, or 100 seeds on the flannel. Cover these with an inverted plate and place in a warm cupboard. You will then easily be able to find out the percentage of the seed that will germinate. It is a good plan to examine seed under a microscope to find whether it is true or whether there are weed seeds mixed with it.

Never sow seeds in ground that is very dry, as they take up a large amount of water before they commence to grow. If the ground is dry, open the drills, flood them with water, and allow some time to elapse before sowing the seed. Cover the seed with dry soil.

Never sow seed when the ground is very wet, or the seed will rot. Open the drills in the morning for the soil to dry, and sow the seed in the evening if the day has been fine. If the soil sticks to the fingers the ground is too wet for sowing.

Seeds require air, and therefore must not be sown too deep. Many small seeds are lost every year in this way. A general rule is to sow seed in the open ground four times as deep as the seed is long, and twice as deep when sown in boxes or frames.

Different kinds of seeds germinate at different temperatures. Thus onion seeds will germinate at a time when marrow seeds would rot.

Seeds may be sown in sandy soil earlier than they should be sown in clay soils. Be guided as a rule more by the condition of the soil than by dates given in gardening books.

Sow good seeds thinly, and thin out the seedlings early. A great deal of labour and seed may be saved if seeds are only sown in places where plants are wanted. If plants are wanted a foot apart in the rows, sow 4 or 5 seeds every foot (parsnips 9 or 10 seeds). Then there is little thinning to be done, and much less overcrowding.

Preparing the Seed Bed.

The ground having been dug in the autumn or early winter, prepare the seed bed by digging it over with a fork some few days before the seed is to be sown. Pulverise the soil to get a fine tilth. The clods must not be chopped to pieces, but broken up by striking them in a slanting (oblique) direction with a fork. Let the soil lie for a time to settle, and then lightly prick up the surface with a fork, and level it with a rake, removing the larger stones. Use the rake lightly, making long strokes, but the raking must not be overdone.

Now refer to the plan of cropping prepared in the winter and set out the line. Be careful that the rows run across the plot at right angles to the sides. Take out the drill with a hoe or small stick. Sow the seeds carefully and cover with soil. Before removing the line mark each end of the row with a stick and label at once. The label should be a stout stake planed. One side should be smeared with white paint and the name of the seed, kind, and date of sowing written with a pencil while the paint is wet.

Make a note in your note-book giving the date of sowing, and later on the date of harvesting, and recording from time to time the state of the weather,

the temperature, rainfall, and steps taken against pests, and how the crop is affected by these things severally.

Sunshine after rain often causes the fine soil to cake. The small plants will have difficulty in getting through the soil. Should this happen run lines down each of two adjoining rows, and with a Dutch hoe break up the soil between the rows. This will mostly break the crust formed over the seeds, and so give them a chance of forcing their way through.

On heavy soils it is a good plan to use a board to stand on when sowing seeds.

On sandy soils the bed should be made fairly firm, but as a rule care should be taken not to do this on clay soils.

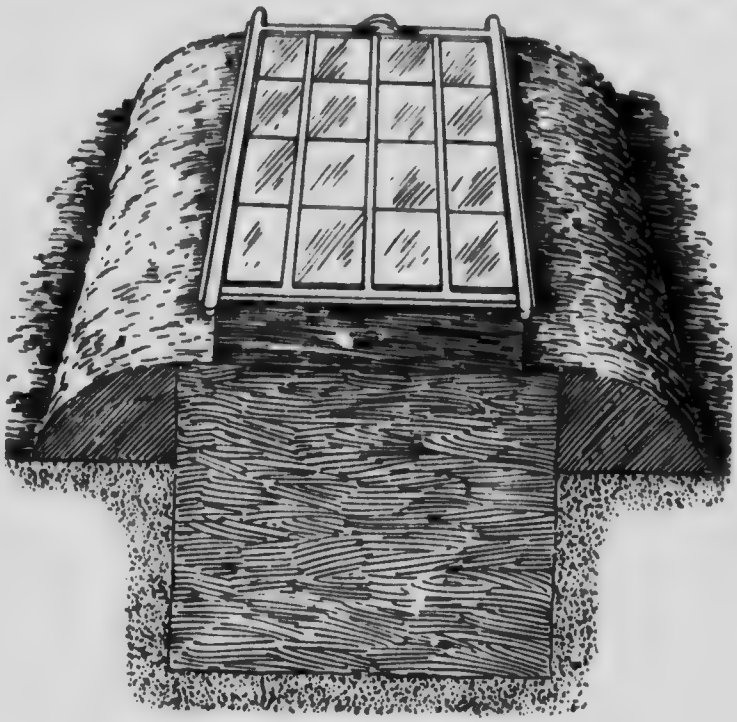
The Garden Frame.

The cold frame is almost indispensable and no garden should be without one. Many plants require protection during the winter months, though they do not require heat. Cuttings of calceolarias, pentstemons, etc., pass the winter easily in a cold frame, though it is better in very severe weather to cover the frame with mats, and the frame should always in winter be placed in as warm a position as possible, where it is shaded from the cold north and east winds. At all times, except in the very cold weather, the frame should be slightly ventilated. As a rule more plants are lost in winter through excess of moisture than through frost.

If the frame is placed over a hotbed then it becomes more useful still.

To make a hotbed get manure from stables where the horses have been fed on dry food, i.e. corn and hay. About half of this manure should be litter. When you get the manure, make it up into narrow

heaps, turning it over two or three times at intervals of three or four days, placing the outside of the heap inside each time, and wetting any part of the manure that has become dry through overheating. Then build up the bed, making it about a foot wider all round



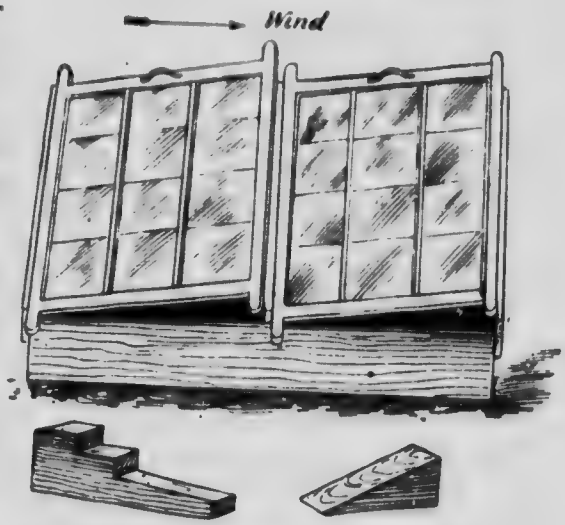
Garden Frame on hotbed

than the frame is. Make the manure firm, or the heat will be violent at first but will not last long.

If leaves be added in the proportion of one part leaves to three parts manure, and well mixed with the manure, the heat will last longer. Be careful to break up all lumps. The deeper the manure bed is, the longer will the heat last. Sometimes a pit is taken out about 1 ft. wider than the frame and filled with manure.

A dry situation must be chosen, and the bottom of the pit covered with drainage material to a depth of 2 or 3 in. The frame should be placed in a sunny position and shaded from cold winds.

Place an inch or two of leaf mould over the manure, and then from 6 to 12 in. of light soil. When the thermometer shows that the heat is steady, or slightly falling, seeds may be sown and crops of early carrots (Short-horn), turnips, radishes, etc. may be sown. While the plants require plenty of space for growth, care must be taken to see that the seed bed is near the glass or the plants will be leggy, or drawn.



Ventilating the frame. Wooden blocks

When the plants are to be transplanted, like onions or lettuces, into the ground, it is best to sow them in boxes, pricking out the seedlings into other boxes or thumb pots when they are large enough to handle, and then, after a time, removing them to a cold frame to harden off before planting out.

Ventilation is important, in order to get short, stocky plants, while the plants must be protected from cold winds. The lights should be raised on the opposite side from which the wind blows. Stepped wood blocks are useful for this purpose.

Watering again is important. While the plants must not be sodden, little sprinklings are useless. Tepid water should be used, and the watering done in the early part of the day, so that by ventilation their leaves may be dry before night, as plants are more easily injured by frost when their leaves are damp. Water should not be given during damp, dull weather, or during frosts.

Protective coverings, e.g. mats or dry litter, should always be at hand so that they may be used when frost is expected, and these coverings should not be removed during the period of the frost.

During the summer, the frames may be used for growing cucumbers.

CHAPTER VII

Tuberous-Rooted Plants

1. The Potato.

The potato belongs to the same family as the tomato and the deadly nightshade, which is poisonous. It was brought here from America, where it grows wild, by Sir Walter Raleigh, so it is said. It was a very long time before it was generally cultivated here, but now it occupies a larger space on the allotment than any other vegetable, and its food importance is so great that the Government is urging farmers to plant larger and larger areas.

Cultivation.

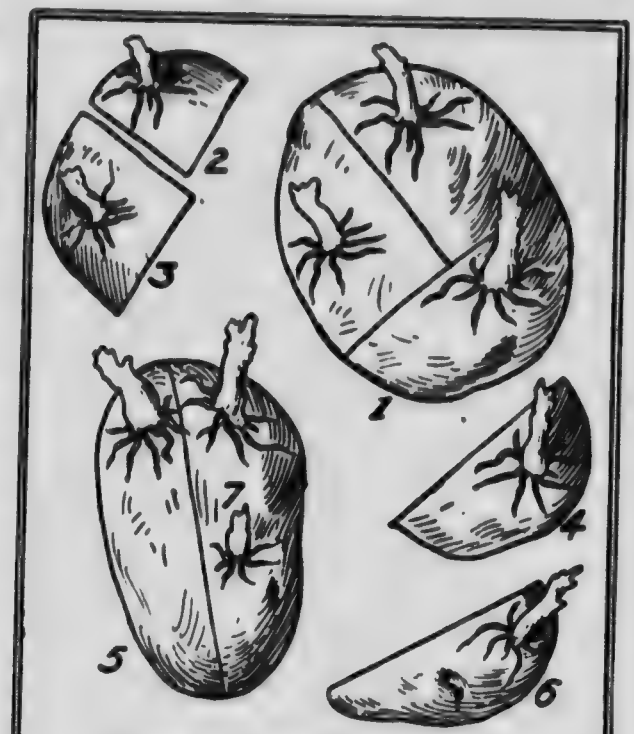
The ground must be deeply dug. This is essential, and must not be neglected. In well-dug ground the average crop in 1916 was 14 tons per acre against the average crop on ploughed land of 6¼ tons. The potato does not want a very large quantity of manure. Two piled barrow-loads per rod is sufficient. This may be supplemented by artificial manure at the time of planting—5 parts superphosphate of lime and 3 parts sulphate of ammonia dusted in the trenches at the rate of 2 oz. per yard run. This must only be done if the soil contains lime. Stiff clay ground should be dug or ridged in the autumn, and the farmyard manure dug in then. Don't apply the manure in the trench in the form of a sandwich, as this causes soft, sappy

POTATO—DUKE OF YORK—A FINE EARLY

growth, and renders the potato more liable to the disease.

Propagation.

The potato is propagated from tubers of the previous year's growth. It may be propagated from seeds. The potato plant bears flowers which are followed by potato "apples" as they are often called. The newer varieties of potatoes seldom produce seed, and it is very unusual nowadays to find potato apples. These are somewhat like little green tomatoes. If these are ripened and the seeds sown, the plants the first year produce very small tubers, and if these tubers are planted



How to cut seed Potatoes

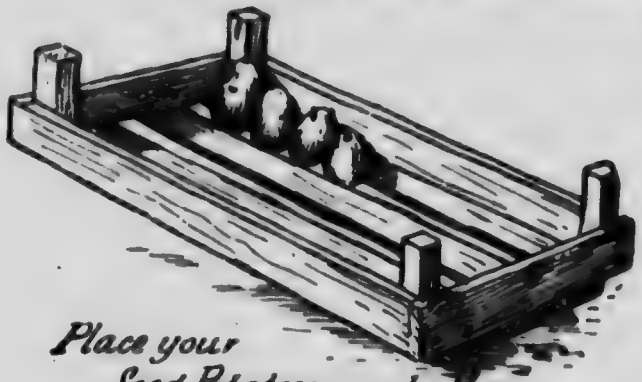
No 1 Main crop Seed Tuber cut into Three sets
Nos 2 3 4 Show the Three sets respectively
No 5 Early seed tuber cut into two sets
No 6 Shows one of the sets No 7 Sprout to remove

the next year they will produce larger tubers. It is in this way that new varieties are raised.

Seed Potatoes.

Size: The best results are obtained by planting whole sets of from 2 to 3 oz. The following results were obtained by the Royal Horticultural Society by planting 80 tubers of "Factor," of each size :—1-oz. tubers produced 151 lb.; 2-oz., 180 lb.; 3-oz., 189 lb.

Large potatoes may be cut, but the crop will not be so heavy as that produced from whole tubers of the



Place your Seed Potatoes in shallow boxes.

proper size. The cutting should be done at the time of planting, i.e. cut, and plant at once, and the cut should be made lengthwise, care being taken that there are eyes on each piece. It is the custom of many people to take a small slice off each potato at the time of planting to make it rot. They have noticed that when a set is found whole at the time of lifting, a poor root generally accompanies it. Now the seed potato does not rot, but is used up by supplying the young plant with food. A ferment digests, as it were, the starch in the set, and

turns it into plant food. When the seed potato is dug up whole, the plant has been suffering from a kind of indigestion.

Sprouting the Sets.

Hundreds of experiments have proved that better crops are obtained from sprouted sets than from unsprouted sets. The seed potatoes should be placed rose ends uppermost in shallow trays in November. They should be fully exposed to the light and placed in a frost-proof shed. They must not be allowed to sprout while in store; such sprouts will be white, long, and brittle, and will easily break off. Breaking off the first sprouts has also been found by experiment to greatly reduce the crops. At planting time the shoots should be short and turdy, and from ½ in. to 1 in. long.

Summarised the advantages of sprouting are :—

(1) An increased crop.
(2) Later planting with the soil in better condition.
(3) No gaps in the rows.
(4) Perhaps prevention of disease. Some potatoes in the sprouting boxes will not sprout. If these are cut, brown streaks will be noticed in the potatoes. This is the mycelium of the dreaded potato disease, and, though this has not been fully proved, it may be the means of introducing disease into the crop.

Planting.

Take out trenches deep enough for the sets to be covered about 4 in. This is the way to be recommended, though other ways are practised. Some use a dibber, which is certainly not to be recommended especi-

ally in heavy soils. The soil is consolidated on the outside of the hole, and the roots of the plant will find a difficulty in piercing the solid mass. Potatoes like a free root run. If you do not take out a trench, plant with a trowel. Plant the sets with the rose end uppermost, after rubbing off all the sprouts but two. Don't plant when the soil is wet--wait.

Time of Planting.

Opinions vary as to the best time. Remember the potato is a tropical plant, and frost is fatal. Nothing is gained by early planting but much may be lost. Sharp frosts are often experienced as late as May 24--27, and frost is more severe in the valleys than anywhere else. If the potatoes are up by this time something must be used to protect them. Spreading pea sticks over the beds is an excellent way. Mid-April is a good time to put in the bulk of the crop.

Don't plant too close together. You may get plenty of potatoes but they will be small. The following distances have been found to pay best :—

Earlies.—Trenches 2 ft. apart, sets 12 in. apart in the rows.

Second Earlies.—Trenches 2¼ ft. apart, sets 15 to 18 in. apart in the rows.

Lates.—Trenches 2½ ft. apart, sets 15 to 18 in. apart in the rows.

Varieties.

The number of varieties is legion. Find out the varieties that suit the district. The following are good : Earlies—May Queen, Sharpe's Express, Mid-

lothian Early. Second earlies—Great Scot, Sir John Llewellyn, British Queen. Mainerops—Arran Chief, Golden Wonder (fine flavour), King Edward (on heavy soil). New sorts are continually being produced, and it is a good plan to try a few tubers of a new kind every year in the Experimental Plot.

After Cultivation.

Hoe or fork up between the rows as soon as the plants show.

Earth up when the plants are 6 in. high, and give a further earthing up later on.

This earthing up is a most important matter.

The object of earthing up will be understood if a potato plant is examined. The plants appear to have two kinds of roots. The fibrous roots are the feeding or true roots, while the thicker ones are the fruiting stems, and on these the tubers grow. These stems do not spring from the bottom of the stalks, and if the plants were not earthed up, the potatoes would show above the soil. The light would turn them green. They would become poisonous and unfit for human food. Exposure to light, except for seed potatoes, for any length of time should be avoided. There is another reason for earthing potatoes which will be dealt with later.

Lifting.

Early potatoes are lifted as soon as they are large enough to eat before the skin is set. Other potatoes should be lifted when the skin does not easily rub off. The yellowing of the haulm will tell when the potatoes have ceased growing.

If a few seed potatoes (first earlies) have been left from the first planting, they may be planted when the early potatoes are lifted, and then new potatoes may be dug in early October.

Storing.

The potatoes should be sorted into small, seed, and "ware."

The latter two should be dried and stored, care being taken that no diseased potatoes are placed in the store.

The potatoes may be stored in hampers in a frost-proof shed or cellar, or they may be placed in

clamps, but wherever they are placed, they must be kept dry. They should be examined from time to time to see if they are suffering from rot. This may be

ordinary rot or winter rot which causes the potato to dry up.

To make a clamp a dry spot in the garden about 4 ft. wide should be chosen. Dry ashes should be spread on the soil, and the potatoes piled up in a cone or prism. These should be covered with a

good layer of dry straw. A kind of ledge should be left all round the clamp, and from a trench the soil should be built up till the whole is covered to a depth of 6 in. Ventilation holes are left at the top of the clamp by pulling out wisps of straw. Before the severe weather comes these holes should be closed by earth.

Should the potatoes by any chance be frozen, cover them up so that they thaw very gradually, and you will in all probability save them.

Disease

The potato has perhaps more than its fair share of diseases. Leaf curl, black leg, and rust may be prevented by change of seed—a plan which is also recommended because of the increased crop it always gives, and, if possible, seed should be obtained from Scotland or Ireland. It has been found that better crops are obtained from seed-potatoes that were lifted before they were thoroughly ripened, and this may be one of the reasons why Scotch seed gives such good results, as potatoes, owing to the climate, never thoroughly ripen in Scotland. Avoid seed that has been grown in sandy soil. Green fly infests the leaves—an insecticide will get rid of them—and the wireworm plays havoc with the tubers.

The worst enemies are the fungoid diseases—black scab and the blight.

The former is recognised by a black corky mass (see illustration) growingout of the tuber, and is so serious that the Board of Agriculture must be notified immediately it is discovered.

The potato disease or blight fortunately can to

BLACK SCAB (WART DISEASE) POTATO

a large extent be prevented. In this case the fungus attacks the leaves. Brown patches, which turn black, appear, and soon spread. If the under side of the leaf is examined the dark patch is seen to be surrounded with a kind of mould. Seen under a microscope this mould consists of immense numbers of tiny roots, the ends of which carry spore cases. These burst, and the spores either drop on the soil or are carried away by the wind. If the spores come into contact with the tubers the disease attacks them. Earthing up potatoes protects them to a certain extent, and if the earthing is well done the rain will carry the spores down the sides of the ridges, and so away from the tubers.

Potato leaf attacked by disease

Spraying.

The Board of Agriculture is doing its utmost to persuade everybody to spray, in order to prevent this disease which cannot be cured once it attacks the crop. Spraying not only tends to prevent the diseases, but also increases the crop of potatoes by 2 or 2½ tons per acre. Either Burgundy or Bordeaux mixture should be used. The Board of Agriculture recommends the former. The mixture is made by dissolving separately 1 lb. of copper sulphate

(blue stone or vitriol) in 8¾ gal. of water, and 1¼ lb of soda (washing) in 1¼ gal. of water. Dissolve in wooden or earthenware vessels, and then mix the two together by adding to the soda solution the solution of copper sulphate and well stirring the mixture. It must be used within ten hours of mixing, and must be applied by a spray or syringe. A knapsack sprayer is generally used, but any ordinary spraying syringe, e.g. Abol, will do, but it must produce a fine mist-like spray. It is most important that the under sides of the leaves are wetted as well as the upper sides. The spraying is best done in the evening or early morning. The spray must dry on. If it rains before this has taken place, then the spraying must be

A knapsack spraying machine in use: this is invaluable for spraying potatoes and fruit bushes

done again. It takes a very heavy rain to wash off the film once it has dried on. When the spores of the disease come in contact with this film they are unable to grow. The first spraying should be done early in July, and repeated about three weeks later.

There is always danger in using chemicals on plants. Test the Burgundy mixture with litmus paper. If the paper turns red, more soda must be added. The mixture may also be tested by dipping the bright blade of a knife into it. If a copper deposit is left on the blade more soda must be added.

Where the spraying has not been successful it has been found that either—

(*a*) The spraying has not been done properly, i.e. both sides of the leaves not wetted.

(*b*) The mixture has not been properly made.

(*c*) The leaves of the potato had been attacked by green-fly, and the mixture had got into the plant itself through the holes made by the suckers of the fly, or

(*d*) The chemicals were not pure.

Artichokes.

Jerusalem artichokes are a good substitute for potatoes, and are very prolific. As they grow tall, and are not particular as to soil, they may be used as screens for the protection of other crops. The ground should be well worked, and the tubers planted 1 ft. apart, 2 ft. between the rows, in early March. They may be left in the ground and dug as required. Care must be taken to leave no part of an artichoke in the ground, as every piece will grow. Plant in February or March.

The white kind gives the better-shaped tubers.

CHAPTER VIII

The Cabbage Family

THE cabbage family supplies us with "greens" throughout the year. It is a large one, and includes white and red cabbage, savoys, brussels sprouts, cauliflowers, broccoli, kale and kohl-rabi. All have a common parent in the wild cabbage which is found in this country growing on cliffs near the sea. Knowing this we can easily understand that all plants of the cabbage family grow better and keep healthier when

When planting out greens, take care to discard "blind" plants, a specimen of which is seen on the left: a healthy seedling is shown on the right. The "blind" plant has a defective centre

lime and salt are present in the soil. In this family the cabbage has the greatest food value, while brussels sprouts, perhaps the most popular of all greens, has the least.

As seedlings all require the same treatment they should be sown thinly, and transplanted when quite small, and should never be allowed to become over-

crowded. If allowed to remain in the seed-bed too long they become drawn and weakly, or leggy as it is generally called, and seldom give satisfaction. If, on the other hand, they are pricked out early, they grow into short sturdy plants which are a delight to the gardener's eye. When pricking out the seedlings, handle them very carefully by the leaves and not the stems.

N.B.—It is most important that the cabbage family should be sown and grown in soil that is well supplied with lime.

The Cabbage.

The cabbage is a very important vegetable, especially in the early spring. To obtain the spring cabbage, sowings should be made in the open ground the third week in July, and again in the second or third week in August. Care must be taken in the selection of the kind of cabbage, as some varieties are not suitable for autumn sowing, and "bolt" in the spring instead of forming hearts.

Sow thinly and transplant early in October, using a trowel, into firm ground, preferably an old onion bed. The bed should not be dug, but should be hoed to destroy the weeds. As the plants have to stand the winter the stem must be firm. If the ground is dug, the plants make quick growth, the stems and leaves will be soft and succulent, and are then liable to be killed by frost. Some gardeners prefer to plant with a dibber at this season as the plants are not so likely to make much growth.

Plant in rows 2 ft. apart and 18 in. between the plants. Large cabbages, like Enfield Market, will require more room.

In February a dressing of nitrate of soda or sulphate of ammonia will hasten their growth considerably. Autumn-sown plants are not often attacked by the cabbage root fly.

Summer cabbages are not so much in demand, but if wanted, sow in March. An April sowing will provide plants for the autumn.

Coleworts sown in May will be found exceedingly useful for cutting as bunch greens in winter. Plant in rows, about 1 ft. apart.

Before planting greens dip them in a lime and soot mixture

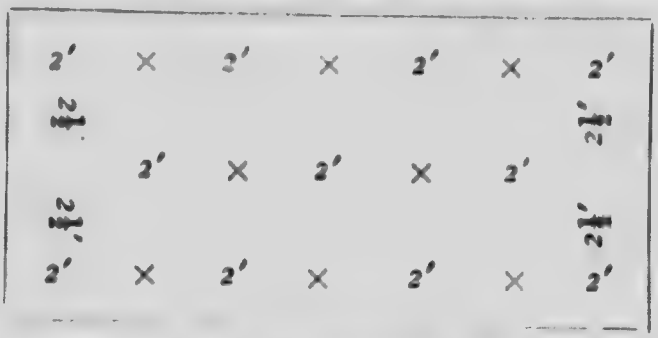
As the cabbage is a gross-feeding plant the ground in which it is grown must be in good heart, but firm. During the growing season occasional light dressings of 1 oz. per square yard of nitrate of soda, or sulphate of ammonia (use the latter only if the ground is well limed) will help the growth considerably. Liquid manure applied occasionally will have a similar effect. The best flavoured, tender cabbage is one which has been grown quickly, and therefore good cabbages cannot be grown in poor soil. The best soil is one that has been well manured for a previous crop.

Kinds.—Autumn sown: Wheeler's Imperial; Sutton's Harbinger; Ellam's Early. Spring sown: Spring Express. **Red Cabbage,** which is grown for pickling, differs from ordinary cabbage only in colour. It requires the same cultivation as the ordinary cabbage with deeply dug and well-manured soil.

Cauliflowers.

Cauliflowers are most useful in autumn. They should be sown in March or early April and planted in June, in rich, deep, moist soil. Good cauliflowers can be grown only in well-manured ground. The manure retains the moisture which the cauliflower must have to give satisfactory results.

Give the plants plenty of room, 2½ ft. between the rows, and 2 ft. apart, should be the minimum. Plant as per diagram, as this makes the best use of the space.



Earlier plants may be obtained by sowing at the end of August, and protecting the plants during the winter in frames. Give them plenty of air, and keep them growing steadily. If checked, they will form little heads, or buttons, as the gardeners say. Plant out in February if the weather is favourable, lifting the plants with nice balls of earth to their roots. Plant in a warm border.

Seeds may be sown in a warm frame in February. The plants should be pricked out in the frame, hardened off, and planted out in April.

Autumn Giant is the most useful cauliflower. Early London and Walcheren are earlier.

Winter Greens.

As these plants have to stand the winter, and as frost attacks and kills them when the growth is sappy, great care should be taken to keep winter greens sturdy. The stems should be hard, therefore plant in firm ground, not over rich.

Thin sowing is very important, and the young gardeners cannot learn this lesson too soon. Short, thick, sturdy stems should be the aim of the gardener in raising all seedlings, and this is especially important when raising winter greens.

The seeds should be sown in early April, and the plants pricked out when quite small. They should be planted out in June.

In spring the plants should be pulled up, and burnt when they have ceased to be profitable, and not left in the ground to flower and seed. This greatly impoverishes the soil, i.e. it wastes good plant food which would be beneficial to a succeeding crop.

Brussels Sprouts.

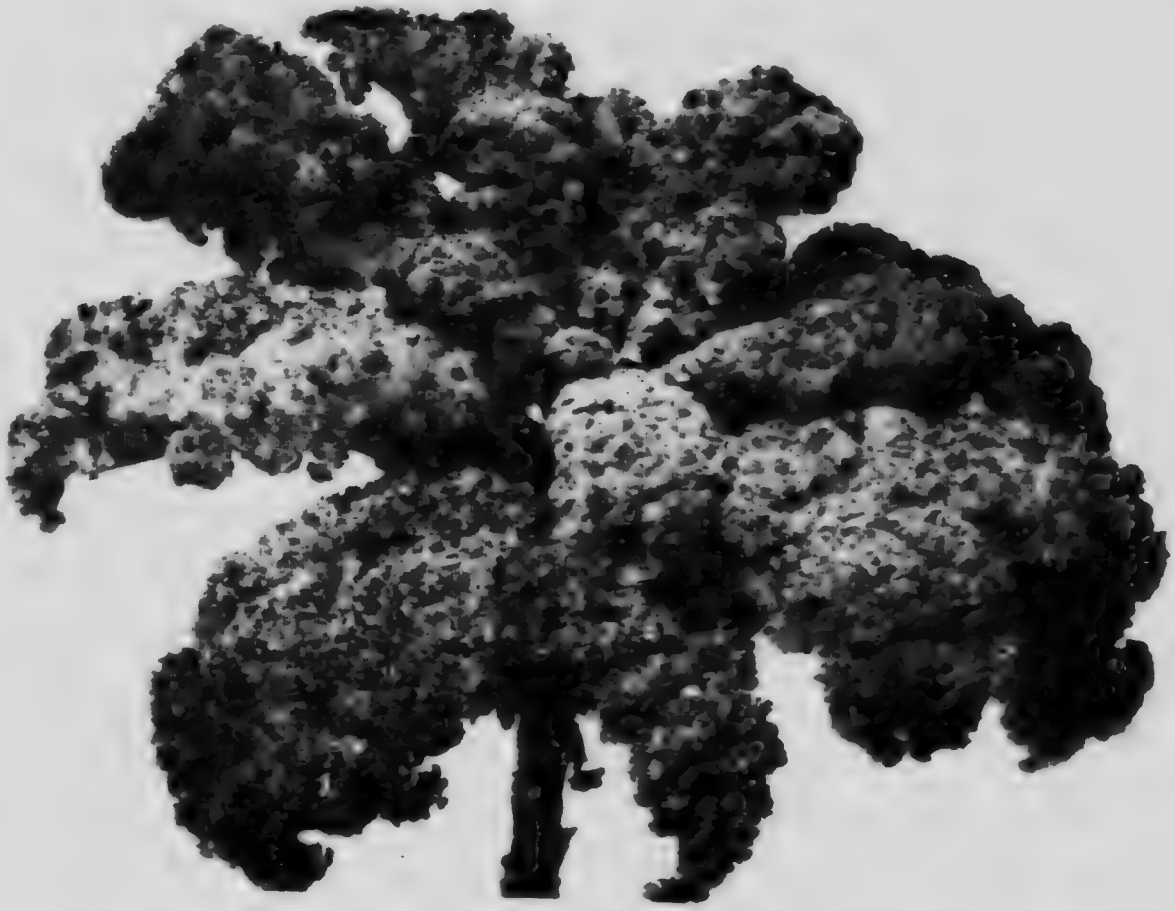
Brussels sprouts are the most popular of all winter greens, and should be sown a little earlier than other winter greens. The last week in March is a good time for sowing. Transplant early, and put them into their permanent quarters in June, allowing at least 2 ft. from plant to plant, and 2½ ft. between the rows. As the plants grow rather tall they are apt to be blown about by the wind. To prevent this, earth them up. This practice may be followed with advantage with most of the cabbage tribe. Not only will the rows then have a tidier

appearance, but roots will form higher up the stems, and the crop will benefit.

Take off the bottom leaves as they turn yellow.

Brussels Sprouts

Many people make the mistake of cutting off the heads first. These should be left till last, otherwise the buttons will commence growth and burst. Gather the large buttons as they become ready, leaving the smaller ones to grow. Cut them off



CURLY KALE

with a knife, leaving a piece of the stem, and a second crop of smaller buttons will give a further supply.

Borecole, or Kale.

These are all hardy and the sprouts are especially useful in the early spring. Cut off the heads first. The plants will then sprout better. Drumhead Kale will supply cabbage-like heads during the winter, and sprouts in the early spring. Asparagus, Curly, Cottagers' and Russian Kales are all useful.

Broccoli.

These are of two kinds—those which form heads like cauliflowers, and the sprouting broccoli. Purple, green and white sprouting broccoli are all good.

From the cauliflower broccoli we get a supply to succeed the autumn cauliflowers, lasting throughout the winter into May and June. There are many varieties which can be sown—Michaelmas White, Snow's Winter White, Leamington, Mammoth, and Late Queen will give a succession.

The Savoy.

This vegetable is similar to a cabbage except that it has crinkled leaves. It is much hardier, and will stand a considerable amount of frost. The Ormskirk variety will often survive a winter when other green stuff has perished. The smaller varieties are more tender, and of a better flavour than the larger ones. Sow at the end of April, and in early May for succession, and treat them exactly as you treat the cabbage.

CHAPTER IX

Cabbage Diseases and Pests

Club Root.

This disease is also known as "Anbury" and "Finger and Toe." It attacks all Cruciferæ, i.e. plants whose flowers have four petals arranged in the form of the old Greek cross. Wallflower, turnips, and some weeds like the charlock are subject to the attack of this dreaded disease.

A young cauliflower attacked by club root

If the disease once gets into the ground, the germs lurk there ready to attack any of the cabbage tribe that is planted there. Even if cabbage has never been grown on a piece of ground, yet that ground may have been infected with the disease by weeds which have suffered from it.

The wild cabbage grows on chalky cliffs. This will help us to understand the kind of soil the cabbage requires in order to keep healthy. Some authorities say that well-limed soil will prevent the disease from making its appearance. Therefore see that the plant is sown and grown only in soil that has been well limed. Lime will not cure the disease, but it will greatly help to prevent it.

The disease shows itself first by a thickening of the roots. These become swollen and distorted, hence the name "Finger and Toe." If the diseased root is cut open the interior will be found to contain a dark, slimy, evil-smelling mass of putrid matter.

Prevent, by all means possible, introducing the disease into the soil. Examine all purchased plants, and burn at once any with thickened roots.

Attacked plants wilt in the sunshine, even when the ground is damp. Dig them up carefully, get out every bit of root, and burn. Never throw cabbage stalks on the compost heap, always burn them.

Fill up the hole from which the diseased roots were taken with quick lime, and avoid planting cabbages and turnips on that piece of ground for three years.

The cabbage root fly is a most destructive pest. The sketches show the fly, maggot, and pupa, together with the damage caused

The Cabbage-Fly and the Cabbage-Weevil.

Both attack the roots of the cabbage family, and both cause swellings on the roots, which are sometimes mistaken for club root. The female fly lays its eggs in the stem about the ground level, and the weevil lays its eggs on the roots. Maggots, white in one case and yellowish in the other, hatch out and cause swellings. The plants wilt in the sun, and the leaves have a leaden hue. To prevent attacks many gardeners when

planting first dip the roots of the plants in a liquid mud made of clay, lime, soot, and sulphur. Make this mud a day or two before it is required, or it may burn the roots.

When the plants are seen to be attacked, pull them up, burn the roots and fill the hole with soot and quicklime; or dig in a soil fumigant to kill any pupæ in the soil, and so prevent future attacks.

Plants are often attacked in the seedling stage. To prevent an attack, syringe the little plants two or three times a week with paraffin emulsion to send the flies elsewhere.

Tarred discs placed round the stems of the plants just at the ground level are said to prevent attacks by the fly, but care must be taken not to cover the discs with soil.

Cabbage Butterflies.

These are the most common of all butterflies. There are three kinds—large white, small white, and green veined. The butterflies lay their eggs on the under sides of the leaves in patches. The eggs are yellowish and hatch out in about ten days. The caterpillars are also yellowish in colour, with brighter yellow stripes and dark markings. Like all caterpillars, they are divided into several segments. They have three pairs of legs in front, and several little knobs behind which act as feet, while at the tail they have a pair of ·spers. They are small at first, but feed voraciously. As they grow larger they change their coats four or five times. Then they cease feeding, and pass into the chrysalis stage. Here a wonderful change takes place, and from the waterproof case emerges the

butterfly to lay its eggs on the plants, and so give rise to another generation.

If not checked the caterpillars quickly spoil the green crop. They strip the leaves till only the midribs remain. The only really efficient remedy is hand-picking, though their ravages may be checked by placing a good handful of common salt in a pail of

Cabbage butterflies, caterpillars, and chrysalis

water, and syringeing the plants with the mixture. Syringeing with a soft soap and quassia solution while the caterpillars are young is also useful.

Caterpillars of various moths also feed on the various members of the cabbage tribe. If caterpillars from cabbages are examined, it will be seen that there are more than three kinds.

Good cultivation and constant hoeing will help to protect the plants.

CHAPTER X

Pod-Bearing Plants

Peas.

Peas are the most delicious of summer vegetables, and efforts should be made to get a long supply. This can be done by sowing at intervals.

An early sowing of a round-seeded variety can

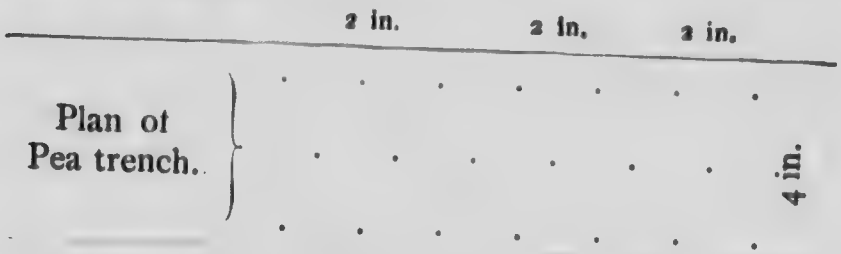
By sowing successively from March until early June, green peas may be obtained from June until autumn

be made in February, but this should not be done if the ground is sodden. Further sowings can be made in March, April and May.

It should be remembered that early varieties do not mean varieties that can only be sown early, but varieties that come to maturity quicker, and when late sowings are made these varieties are often the best to sow.

Peas require a rich soil with plenty of moisture, therefore the ground should be dug at least two spits deep, and be well manured. Manure retains moisture much better than soil, and a good crop of peas can never be obtained from dry ground. If the plants get dry the pods will not fill, and artificial watering will be of little use. The ground should be kept well hoed, and the plants will benefit greatly if the rows are mulched with short manure or lawn mowings.

Sow in shallow trenches 3 in. deep, and in light soils 4 in. is not too deep. Place the seeds 2 in. apart. If the seed is sown too thickly the plants must be thinned.



Plan of Pea trench.

To obtain an early supply of peas they are often sown under glass in pots, or in pieces of turf placed grass side down. These plants are hardened off, and planted out in late March or early April.

If planted early in the open ground, ridges of soil on each side of the rows, or little twigs of evergreens will help to protect the young plants from cold winds.

All peas which grow more than a foot high should be staked, and even dwarf peas benefit by having a few twigs placed alongside to keep them off the ground. Stake early, before the plants drop. Hazel sticks are best. The proper way to stake peas

To protect peas from birds and mice place them in a tin with holes at base: moisten the seeds and sprinkle a little red lead on them. Shake the tin to get the peas well covered and place in a sunny spot to dry. Or soak a cloth in paraffin, place on the peas and roll the cloth well

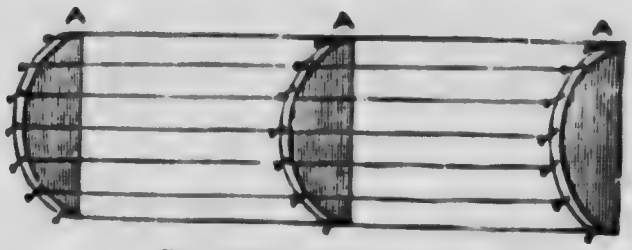
is to make the stakes slant outwards so that they are wider at the top than at the bottom. Stake firmly.

Birds, mice and slugs are often troublesome. To check their ravages, damp the seeds with paraffin, or soak them in paraffin for not more than fifteen minutes, and roll them in red lead before sowing. The mice will then most likely leave them alone. To catch mice break-back traps, baited with bread, should be placed along the rows at night, and removed during the day.

Dust the rows frequently with soot and lime, to keep off the slugs. Sparrows will nip off the young shoots immediately they appear above ground Protect with wire pea-guards, but as these are expensive, black cotton stretched above the rows is an excellent substitute.

Syringeing in the evening with paraffin emulsion is another protective measure.

If the roots of peas, beans, or any of the vetches are examined, little white warts or nodules will be



Pea guard with cotton.
(A) Semi-circular pieces of wood with nails.

found. These are the homes of thousands of bacteria which supply the plants with nitrogen from the air. As these plants supply themselves with all the nitrogen they require, there is no need to apply nitrogenous manures, like nitrate of soda or sulphate of ammonia, to them. When clearing away peas leave the roots in the soil, as the nitrogenous matter stored in them will be of benefit to a future crop. This will also partly explain why the farmer generally gets a good crop from land which in the previous year carried a crop of clover.

A dusting of superphosphate, 3 oz. per 8yd. run, and half that quantity of sulphate of potash forked in

before sowing the peas will greatly benefit the crop. Potash manure is especially good for peas.

Beans.

Three sections of beans are grown in most gardens —broad, dwarf French, and scarlet runners.

Broad Beans.

These are hardy, and may be sown in November and early March. They are generally sown 4 in. deep

and 6 in. apart in double rows 8 in: to 10 in. apart. There are two kinds—the Longpod and the Broad Windsor. The former carries six or seven beans in the pod, and the latter generally contains three or four.

The Longpod is the hardier, and should be sown first.

The plants are often attacked by the black or dolphin fly, which is a near relation of the green-fly. Immediately a black-fly is seen pinch off and burn the

tops of the plants. Sometimes the attack is so bad that a great part of the plant is covered. When this happens pull up the whole lot and burn, as the insects by sucking out the juices of the plant, cripple it completely and prevent it from bearing a crop. Soot or

French, or Kidney, Bean: Canadian Wonder

slaked lime dusted freely on the plants will often prevent an attack.

Pinching out the tops not only checks the spread of the fly, but it causes the beans to swell more quickly, and increases the size of the pods, as the energy and food which the plant would have used to extend its growth are transferred to the pods.

Dwarf French Beans.

These beans are tender, and easily injured by frost. The last week in April, or the first week in May, is quite early enough to sow. An earlier crop may be obtained by sowing in pots under glass, and planting out, after hardening the plants, in late May. If the leaves are injured by frost the growth will be stunted, the black-fly will certainly attack them, and poor results will be obtained. It is very difficult indeed to destroy the fly on beans when it has once obtained a foothold. Syringeing with an insecticide may check them.

Beans, like peas, require plenty of moisture. The ground should be deeply dug and well manured. The seeds should be sown 2 in. deep, 10 in. or 12 in. apart in double rows 2 ft. asunder. As they sometimes germinate badly, plant two seeds together, and if both come up pull out one plant. Slugs are very fond of the young plants. Dustings of soot and lime, frequently applied will protect the plants. These beans are generally sown much too thickly. A few seeds sown thinly in boxes will often prove useful to fill up gaps.

Canadian Wonder is the sort generally sown but try Masterpiece or Magnum Bonum.

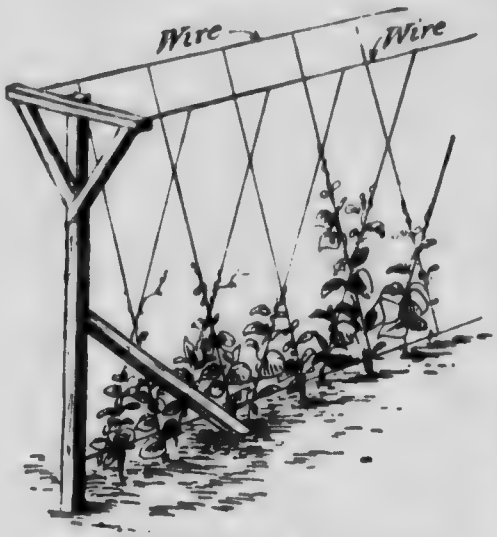
Gather the beans young, and don't allow any pods to mature or the plants will fail to give a good crop.

Climbing varieties of this bean are also grown. These require stakes, though they are not as a rule so tall as runner beans.

Scarlet Runners.

These beans get their name from the scarlet flowers and climbing habit. They come into bearing in August, and they continue to bear till cut down by frost.

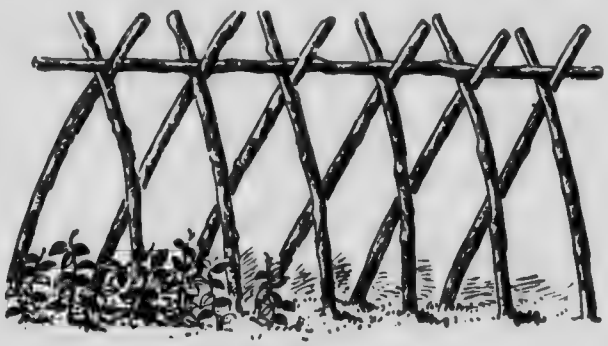
They like a deep, rich, moist soil. The site of an old celery trench is an admirable one for them. Being tender plants, sow the seeds the first week in May (and later on, for succession) in double rows 1 ft. apart with 9 in. between the seeds. The plants are sometimes kept dwarf by continually pinching out the tops, but far better results are obtained by staking. There are several ways of staking, but none is better than that shown in the illustration. Pinch out the ends of the plants when they reach the tops of the stakes.



A good substitute for stakes

Keep off slugs as advised for French beans, and sow a few seeds in a box as a reserve.

Gather the beans while young. If the beans in the


Stakes for Runner Beans

pods are allowed to swell, the plants will cease to bear. The plants produce seeds in order to reproduce themselves, and if the beans are gathered young the plants will endeavour to produce mature seeds in order to finish their work. Cottage gardeners often leave the earliest pods for seeds. This is a bad practice, and reduces the crop. Notice which vines bear the finest pods, mark that vine, and leave all the pods on it for seed.

Both dwarf and runner beans may be dried and used as haricot beans during the winter. The white runner is best for this purpose. Brown Dutch haricot beans may be sown in the same way as dwarf beans, and the pods allowed to mature. Then the whole plant is pulled up and hung in a dry shed. When the beans are dried they may be shelled and stored.

TYPICAL BULBS OF GLOBE-SHAPED ONIONS

TYPICAL BULBS OF GLOBE-SHAPED ONIONS

CHAPTER XI

Bulb-Rooted Crops

The Onion.

The onion is one of the oldest vegetables in cultivation, and has been grown from time immemorial. It is most wholesome and useful. Large quantities are imported into the country from Spain and Egypt.

Onions require a rich soil. As it is a deep-rooting plant the soil must be deeply dug and given plenty of farmyard manure; 3 lb. of superphosphate (or two or three times as much basic slag applied in the autumn) and 1 lb. each of sulphate of ammonia and sulphate of potash per square pole, in addition to the farmyard manure, forked into the ground before sowing, will help to grow fine onions. Deep green fleshy leaves will produce fine bulbs if there is phosphate in the soil to compel them to pour down the food into the bulbs.

It is a good plan to manure and ridge the ground in autumn or early winter. Then when the ground is dry level it in March, and make it firm. Be very careful not to firm the ground when the soil is wet. If the ground is not made firm the onions will be thick-necked and will not keep.

To get fine bulbs for summer use, sowings of Ailsa Craig and Giant Rocca are made in August, and transplanted in March. Another way to obtain large bulbs is to sow seeds in gentle heat in January

or early February, prick out the seedlings in thumb pots or boxes, placing the seedlings at least 3 in. apart. Use rich soil. Then harden off the seedlings and plant them 9 in. apart in rows 1 ft. asunder.

Thinning Onions

In transplanting onions use a trowel, spread out the roots well, and do not plant too deeply. When the plants bulb, scrape some of the soil away with the fingers so as to expose the bulbs.

For ordinary use sow in March thinly in rows 9 in to 12 in. apart. Thin out early, leaving 3 in. or 4 in. between the plants. Make the

During the third week in August bend over the tops of spring-sown onions and scrape the soil away from the bulbs to help their ripening

soil firm round each plant immediately after thinning. Some gardeners sow thinly and leave all the plants, which they say are not then so likely to be attacked by the onion fly.

Bend over the tops in August, lift the bulbs in

September and spread on a hard surface to ripen in the sun. Avoid as much as possible exposing the bulbs to rain.

They may be strung in ropes and hung up in a dry, cool place for the winter; if kept dry they are not easily damaged by frost.

Onion Mildew.

The onion is attacked by mildew. At the first sign pull up and burn the infected plant. Spray the bed with liver of sulphur (sulphide of potassium) ½ oz. to 1 gal. of water to prevent the fungus from spreading.

Roping Onions

The Onion Fly.

In some districts the onion maggot is a great pest, and very difficult to combat. This maggot is larvæ of a fly which lays its eggs on the leaves just above or below the ground level. The eggs hatch out, and the maggots eat their way into the onion bulb, and the attacked plant begins to flag. Once the bulb is attacked there is no cure. Take up the bulb with a trowel and burn it. If any of the maggots are left in the soil they will, most probably travel to the next onion and attack it. Pupæ in the soil will produce flies to attack the crop the following year, therefore avoid using the ground for onions for two or three years.

Various methods as follows are used by gardeners to prevent an attack :—

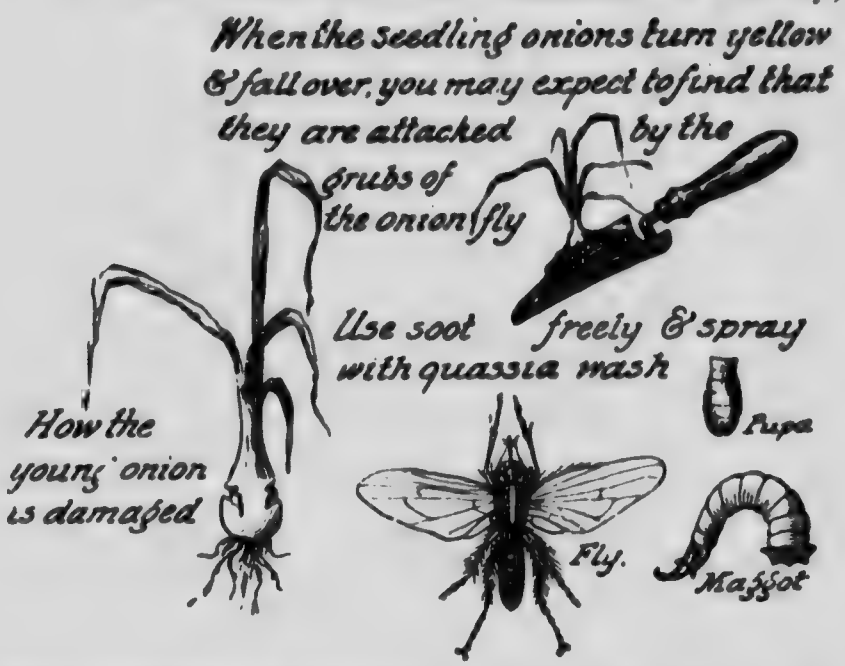
(*a*) Spraying the bed nightly with paraffin emulsion after the seedlings appear.

(*b*) Damping sawdust, sand or coal ashes with paraffin, and sprinkling them over the bed. (Do not make them into a sticky mess.)

(*c*) Dusting the drills thickly with black sulphur at the time of sowing.

(*d*) Keeping the beds well dusted with soot.

All these make the bed distasteful to the fly,



which transfers its attention to another bed in the neighbourhood where conditions are more pleasant.

Onions sown in autumn and February are not so liable to be attacked.

Be careful to make the ground firm round the bulbs after thinning.

Shallots.

Shallots are popular, and deservedly so. They may be raised from seed, but are generally raised from

sets. They are planted early—February is a good time to plant. The sets are planted in rows 1 ft. asunder and the sets 6 to 9 in. apart. They are pressed into the soil to their necks, but must not be covered. The bulbs ripen in July. When the tops turn yellow, lift the clumps slightly with the fork. Leave them a little longer, then pull up, dry in the sun, and store.

The Turnip.

The turnip is not really a root, but is the thickening of the lower part of the stem. A cool moist place suits the turnip best. The best turnips are obtained from sowings made in late June or early July. During hot weather they do best in a place that is slightly shaded. They do well between rows of peas.

Turnips may be sown in February, and again in March and April. Early Milan is a good sort for the first sowing, and Snowball later on. They may be sown in May, but as this means coming in during July and August, they may not be good if the weather is dry. If sown later they benefit from the heavy dews of late summer and early autumn. Red Globe or Chirk Castle are hardy, and good for the later sowings. Early varieties should have 15 in. between the rows and later ones 18 in. Sow thinly, and thin out early. This is the exception rather than the rule, and much seed is wasted. The thinning must take place before the plants fall about. This is the only way to get roots of good quality.

Turnips do best in a light soil that has been well manured, and which contains plenty of lime. A

dressing of superphosphate of lime, 2 oz. to the square yard, and sulphate of potash, 1 oz. to the square yard, will improve the crop.

The plants are sometimes attacked by the finger-and-toe disease, which is the same as club root in cabbage.

The turnip flea-beetle often destroys the whole crop. They riddle the leaves and stop the growth.

Turnip beetle
To prevent attacks of this pest keep the soil moist & encourage quick growth; sprinkle with lime & soot.

To prevent this, dust the plants, while wet with dew, with wood-ashes or soot, or syringe the plant at night with paraffin emulsion.

Sulphate of ammonia or nitrate of soda dusted round, but not on, the plants will hurry on their growth, and place them out of the reach of the "fly," as it is generally called. This pest can only harm the plant in its young stage and when the growth has been checked in some way. Drought is generally the cause of the check, and the ravages of the fly are worse in dry whether. If the plants grow quickly, the pest does very little harm.

CHAPTER XII

Tap-Rooted Plants

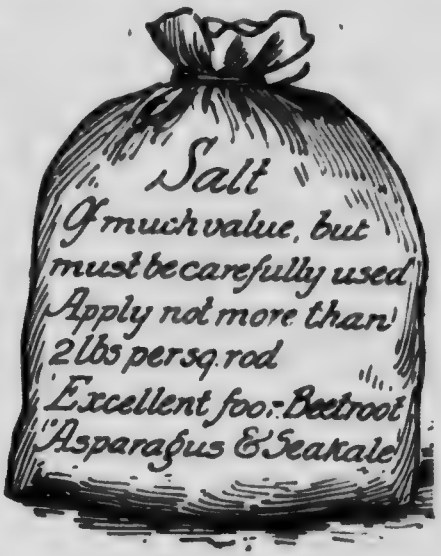
Beetroot.

Beetroot is a very nutritious vegetable and contains a large amount of sugar. From its near relation, the white sugar beet, we obtain the greater part of our sugar supply.

The seed should be sown in rows 1 ft. at least apart, and the plants thinned out to 9 in. Time is saved if three seeds are placed 9 in. apart in the rows. More than three plants may come up, but the beet seeds are really fruits, and fruit generally contains more than one seed. Thin out when the plants have made three or four leaves.

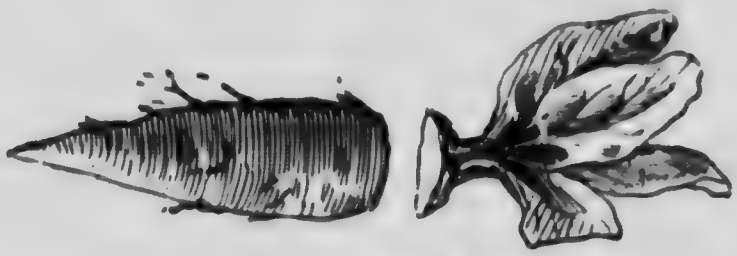
Sow the seed of the round or Globe variety in the middle of April, and that of the long varieties during the first week in May.

All tap-rooted plants should be sown on ground that was well manured for a previous crop. Fresh manure causes the roots to fork. If manure is used it should be placed in the second spit.



A slight sprinkling of salt, ½ oz. to a square yard, forked in before sowing, is good for beetroots, and a similar dressing later on sprinkled between the rows will be beneficial. Salt is especially beneficial when used on dry soils.

Birds are often troublesome. They devour the dark-leaved seedlings immediately they appear above the soil. The Cheltenham green-leaved beet is not



The wrong way to remove Beetroot tops

The proper way to remove Beetroot tops

so liable to be attacked. Black cotton placed above the rows will keep off the birds.

The leaves of the beet are often attacked by a leaf-mining maggot. The maggot is the larva of a fly which lays its eggs in the leaves. This fly has a long ovipositor at the end of its abdomen, by which it pierces the outer skin and lays its eggs inside. Once the maggot is inside the leaf, it is safe from any insecticide. It can be crushed between the finger and

thumb. Dusting the plants with soot, or syringeing them with paraffin emulsion, may ward off an attack. May is the month when most of these flies begin their attacks. The maggots pupate in the soil, and emerge as perfect insects, which attack the plants anew. The plants may be attacked two or three times during the year.

The Carrot.

The carrot is indispensable, and is a very nutritious vegetable. Wild carrots are common in this country. Children often call the seed-heads of this plant birds' nests. From this wild plant we get our present-day carrots—Shorthorn, Intermediate, and long.

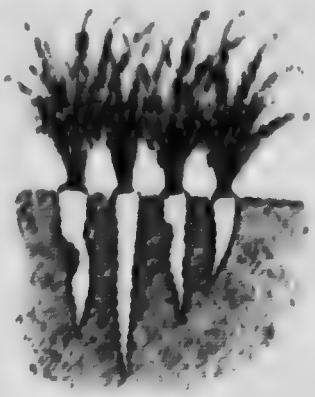
The carrot, like all tap-rooted plants, likes a light soil, free from stones and fresh manure. In some soils the carrot grows without any trouble, while in other soils it refuses to grow at all. In such cases a bed of sand and leaf mould has to be made up, and carrots grown there year after year. The bed must be regularly supplied with nourishment.

To get especially fine roots, deep holes may be made with a dibber, and filled with fine potting

INTERMEDIATE CARROTS—BEST FOR GENERAL CULTIVATION

soil. Two or three seeds are sown, and later on the best plant only is left.

Seeds of the Shorthorn variety may be sown as soon as the ground will permit in February or March on a warm, sheltered border, and the same kind may be sown again in July and early August for late crops. The main crop, Intermediate on shallow soils, and long red on deep soils, should be sown in late April or early May. Sow thinly in rows 10 in. or 12 in. apart. Carrot seeds stick together. To separate them, mix with sand, and rub them sharply together. Thin out early. Late thinning causes the roots to grow out of shape.

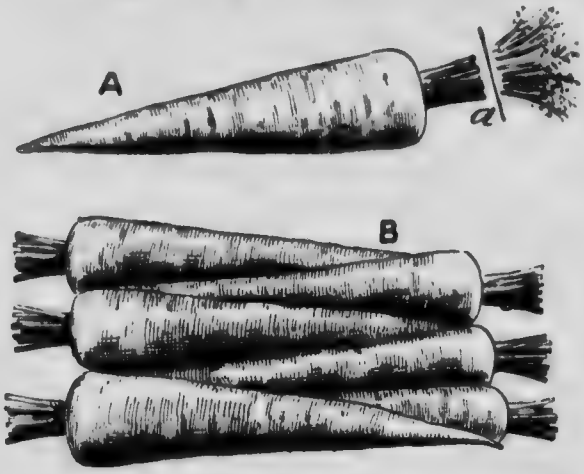


Carrots—bad shape due to late thinning

The carrot fly attacks the roots in many districts and spoils the crop. The eggs are laid about the

ground level, and the maggots eat their way into the roots. The leaves turn sickly, and show which plant is attacked. Dig up and burn the attacked plants. If left, the maggots pupate in the soil, and the next season the fly will attack any carrot crop in the neighbourhood. Dress the ground in the winter with a soil fumigant.

After thinning, the ground round the plants should



A. A root lifted and the top (*a*) removed. B. Roots neatly piled for storing : crowns outwards

at once be made firm by treading. This may help to ward off the attacks of the fly. Some gardeners sow very thinly indeed to avoid thinning as much as possible, while others postpone sowing till late in May, by which means they sometimes elude the attacks of this troublesome pest. Do not leave the thinnings on the ground.

To drive away the fly, use the same precautions as advised for onions.

Some gardeners say that sprinkling the lawn mowings on the bed will keep off the fly.

The Parsnip.

The parsnip has great food value, and is a most useful winter vegetable. It can be left in the ground and dug up when required. Frost does not injure it, and it has a better flavour when so treated than it has when dug up and stored.

The wild parsnip is a native of this country, and from this wild plant the cultivated parsnip has been obtained.

Ground should be deeply dug for tap-rooted plants

It is a chalk-loving plant, and therefore the ground for parsnips should be well limed. Basic slag is a good manure to use on a parsnip bed on account of the amount of lime it contains. On light ground, however, superphosphate of lime should be used as a manure instead of the basic slag, and should be applied at the time of sowing. Basic slag should be applied in autumn. Manure must not be used unless it is put 18 in. deep in the soil. Manure in the top spit will cause the roots to be fanged and cankered.

Seeds should be sown in early March, or as soon as the ground is in the right condition, as parsnips need a long season of growth. Parsnip seeds very often germinate badly, and for this reason should be

sown fairly thickly. Sow in rows 18 in. apart and ½ in. deep. Thin out the plants to 10 in. or 12 in.

To get fine parsnips, make holes with a crowbar and fill in with fine soil. When filling up the holes be careful to fill them up firmly, putting in the soil in small quantities, and seeing that no empty spaces are left. Sow nine or ten seeds in each hole, and make the soil firm. Thin out early. Late thinning in any of the tap-rooted plants causes misshapen roots.

CHAPTER XIII

Leaf Crops

Celery.

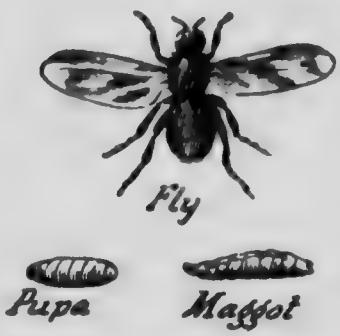
Celery is popular as a salad and excellent as a vegetable. Wild celery is found in this country growing in marshy land near the sea, and is the parent of the garden celery.

As we might expect from its parentage, celery is a moisture-loving plant, and during the whole of its growth must never lack moisture. When watering, a handful of salt put into the can occasionally will be beneficial to the plants.

Seed for an early crop may be sown under glass with a gentle bottom heat at the end of February, and for a later crop in March. As celery seed is very small, it is generally sown much too thickly,

Lift each celery plant with 'ball' of soil about the roots.

and then the plants become drawn and weak. Sow thinly, and prick out the plants when they have made two rough leaves, 3 in. apart, in boxes filled with rich soil.



Celery fly, maggot and pupa

Celery is usually grown in trenches. It is a mistake to make these too deep, as then the plants are placed in the subsoil which is poor, and the plants fail to make satisfactory growth.

Celery is generally grown either in single or double rows. For the former, make the trenches 1 ft. wide, and for the latter, 2 ft. wide, placing the plants at least 9 in. apart.

. . . . . .

. . . .

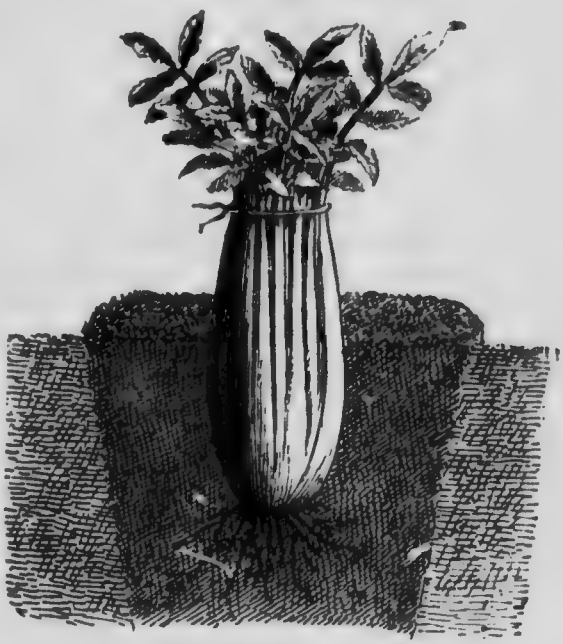
Plan double row

Break up the subsoil, spread a good layer of manure over it, and replace a few inches of the top soil. Plant out in late May or June, lifting the plants from the boxes with a good ball of soil attached to the roots. Choose showery weather for this operation.

Celery, like beet, parsnips, and other plants, suffers from attacks of leaf-mining maggots, which in this case are the larvæ of the celery fly. The eggs are laid between the outer skins of the leaf. The maggots feed on the food manufactured by the leaves, and cause whitish-brown markings. If the leaves are ex-

amined the maggots may be seen. Squash them between the finger and thumb. Pull off the worst of the leaves and burn them. Insecticides have no effect as the maggot is inside the leaf. The only thing to be done is to prevent the fly from attacking the leaves. Syringe the plants with paraffin emulsion or tar water, or dust them while they are wet with soot. Do this early, as the fly often attacks the plants while they are still in the boxes. Continue this right into September or you will then get a further and worse attack. If the plants are attacked early, the maggots from that attack will pupate in the soil and two or three broods will follow.

Before celery is eaten it is blanched by excluding the light. This is generally done by banking the earth around the plants, or by using brown paper collars, but this should not be done till the plants are nearly full grown. The celery may be tied before earthing, which must be done when the soil is moist, but not wet. Care should be taken to



Earthing Celery

prevent the soil getting into the heart of the plant.

Slugs are often troublesome. Two or three waterings, before earthing, with salt water, or water to which two tablespoonfuls of ammonia per gallon has been added, makes the trench unpleasant for them.

The earthing should be done in two or three stages, and when the final earthing is done, the sides of the ridges should be smoothed with the spade to allow the water to run down easily and to keep it out of the heart of the plant.

In hard weather some litter should be laid over the plants to protect them from the frost.

Like all leaf plants, celery is fond of nitrogen, and a watering with ½ oz. of nitrate of soda or sulphate of ammonia per gallon, occasionally after the plants are established, will be beneficial.

White celery is generally grown for early crops, and red, because it is hardier, for the later crops.

Leeks.

The leek is a near relation of the onion. It is a very useful, hardy vegetable, and may be left in the ground all the winter, and dug as required. It is not nearly as popular in the south of England as it deserves to be. In the north of England and in Scotland it is splendidly grown, and there is keen competition in the leek classes in the local horticultural shows.

Seed may be sown outside in a sheltered spot in March, but larger plants may be obtained by sowing in a frame in February. The plants should either be sown very thinly or pricked out 3 in. apart in the open.

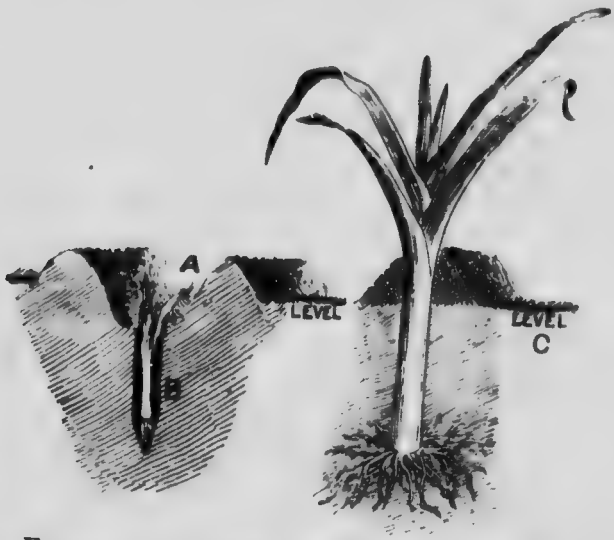
They should be planted either in May or June. The ground should be deeply dug and well manured.

They are often grown in trenches like celery, but good plants may be obtained by making a small furrow, using a dibber to make a hole 6 in. to 8 in. deep, dropping a plant into this hole and watering it in. The water will carry down sufficient soil to cover the roots.

In autumn earth up. It is only the blanched part of the plant that is eaten, and the object of the gardener is to make the blanched part as long and as thick as possible.

The leek is a gross feeder, and occasional waterings with liquid manure, or with water to which has been added ½ oz. of nitrate of soda or sulphate of ammonia per gallon, will stimulate growth.

Paper collars, instead of earth, are often used for blanching.



A. Furrow. B. Leek dropped in hole made by dibber. C. Furrow levelled and the leek earthed

Rhubarb and Seakale.

Rhubarb may be raised from seeds sown in spring, but as three or four years must elapse before the stalks

Forcing Rhubarb

can be pulled, new plantations are generally formed by splitting up old roots. These are split into strong, single crowns, and planted in deep, well-manured soil. Leaves should not be pulled from newly planted crowns the first season after planting.

A cool, moist position suits rhubarb best. It will not grow well in hot, shallow soils. The appearance of the plant shows that it is a gross feeder and a lover of moisture, therefore, to get good rhubarb, the bed must be supplied with manure and moisture in abundance.

Rhubarb is most appreciated very early in spring, and produce may be forced both in the open and under cover. In the open, the roots may be covered with

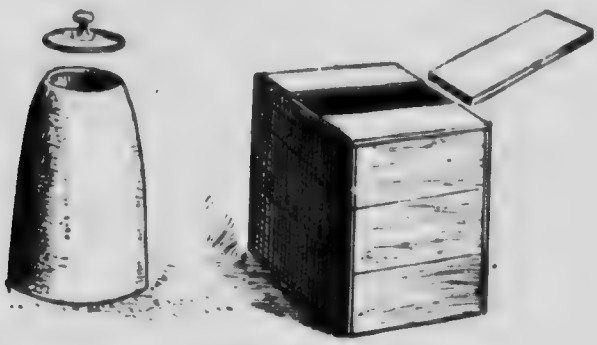
large pots or boxes, which should be surrounded with fresh manure or leaves, or a mixture of both. The heat produced by the decaying matter causes the plant to believe that spring has come and induces it to grow. If the roots are simply covered with litter the crop will be earlier than if grown without any protection.

If the rhubarb is to be grown under cover, the roots are dug after the leaves have died down and left exposed to the frost. They are then packed in moist soil and kept in the dark at a temperature of 50 or 60 degrees.

Seakale.

Seakale may be raised from seed, but it is some time before good produce can be secured by this method.

Established crowns are lifted in autumn or spring, and the thong-like roots are cut into lengths 4 in.



Forcing Seakale

to 6 in. long and planted in good soil in April. If cut off in autumn they should be tied in bundles and placed in damp sand. To distinguish the top from the bottom, cut the tops horizontally and the bottom

obliquely. If planted upside down the crowns will form at the bottom.

If planted in rich soil good crowns will be formed by autumn. The plants are then covered with pots (there is a special kind made for the purpose) or boxes. These are surrounded with fresh stable manure, and the blanched shoots produced from the crown makes a delicious vegetable.

The roots may be dug up and forced inside in a warm position. The shoots must always grow in darkness in order to blanch them.

Asparagus.

A separate bed should be found for this delicious vegetable. As the bed will last for several years, much care must be spent in its preparation. It should be deeply dug, well manured and well drained. The plant does best in a light loamy soil. Heavy soil must be lightened by adding road-drift, leaf soil and burnt earth.

Asparagus beds are generally raised, but the plants do equally well on the flat so long as the drainage is good.

Plants may be raised from seed by sowing in April, but two-year-old plants are generally planted in March in beds 3 ft. wide. The rows are 1 ft. apart and the plants placed 1 ft. asunder in the rows. Plant about 4 in. deep, spreading the roots well out. See that the roots are not allowed to dry by exposure. The top 4 in. of soil should be fine, and mixed with old hot-bed manure, sifted. Firm the bed after planting, water if dry, and rake down fine.

For the first year growth must be encouraged. Water occasionally with weak liquid manure, and very

occasionally with slightly salted water. No heads should be cut the first year. It is a good plan to support the stems to prevent them being broken by the wind. When the stems turn yellow cut them down and top dress with rotten manure.

If the plants come up strong a few heads may be cut the second year. Repeat the waterings with liquid manure, and give annual dressings with manure. Stop cutting in the middle of June. The bed should be hoed over in early spring and afterwards kept free from weeds. Encourage the grass to grow strongly when cutting has finished as the food produced in it will be stored up in the roots to produce the next season's crop, and the stronger the grass grows in the late summer the better will be the crop in the succeeding spring.

Spinach.

Spinach may be sown in February, March and April, and again in August. Use a hardy kind in this last sowing to stand the winter. The early sowings may be made between rows of peas. Thin out well or the plants will quickly run to seed. In picking remove only the large leaves.

Spinach beet, and seakale or silver beet, are often used as substitutes for spinach and yield abundant supplies. The leaves only are of use. The stalks and midribs of silver beet are used as a substitute for seakale.

CHAPTER XIV

Fruits Used as Vegetables

Cucumbers.

Cucumbers are grown in greenhouses, frames, and in the open air. Place one seed in a pot and put on a gentle hotbed, or seed may be sown where it is to grow.

Good crops of cucumbers are grown in frames on a hotbed. If it is a small frame put one plant in the centre, but if a large frame is available put one plant towards the back and the other towards the front. Pinch out the growing point just before the plant commences to run, and then train the shoots towards the sides.

When a cucumber has formed, pinch off the growing point just beyond the next leaf and when the cucumber is cut, cut back the stem to the next leaf.

Place an oblong piece of glass or slate under the growing cucumber. This will help the fruit to grow straight.

Cucumbers require plenty of moisture, and a close atmosphere. Ventilate a little in the middle of the day, but close the frame early, syringeing the plants with tepid water. Dryness at the roots means failure and an attack of red spider. Shade slightly in very hot weather.

Ridge cucumbers succeed in the open air if treated like vegetable marrows.

THIS IS THE KIND OF TOMATO PLANT TO PUT OUT OF DOORS IN EARLY JUNE

Tomatoes.

Tomatoes are grown very largely out of doors and they succeed admirably in some seasons.

A well-sheltered spot is the best place for them.

Fig. 1.—*a*. Young shoots in axils of the leaves to be removed. Fig. 2.—*b*. Top pinched out

They may be grown at the foot of a south wall or be trained to sticks 4 ft. high. Put them where they will get plenty of sun.

Seeds may be sown on a gentle hotbed at the

end of February or early in March. Place the seeds thinly in pots or boxes, transplant singly into thumb pots, or four inches apart in boxes, while quite small. The young plants are hardened off in a cold frame and planted out in early June in *firm* soil not freshly or richly manured or there will be plenty of leaves and no fruit.

Keep the plants to a single stem by pinching out *when quite small* the little shoots that spring from the axils of the leaves. See that no shoots grow up from the base of the plants. When the plants show three or four trusses of bloom pinch out the lead.

When some of the fruit has set, the plants may be fed with weak manure water, Clay's Fertilizer, or guano (½ oz. to a gallon of water).

Keep the plants well tied to the stake. When tying, fasten the material firmly to the stake first, and then make a loop round the stem of the plant, but not tight enough to pinch the stem. Make reef knots which are quite safe. To do this is quite simple. Make the first tie, turn in the ends of the tying material parallel, i.e. without crossing, and then tie. *After* the fruits have developed, remove as little of the leaf as possible in order to expose the fruit to the sun.

If the fruit does not ripen by mid-September, gather it, wrap it up snugly in clean paper, and pack in a box in the cellar. However, there are many ways of making use even of green tomatoes.

Vegetable Marrows.

There are two varieties of vegetable marrows—bush and trailing. The former is the earlier and stands

dry weather better than the latter. The bush marrow occupies only about a square yard, while a well-

Seeds of Vegetable Marrow may be sown singly in small flower pots as shown, or out of doors where they are to be grown. The former method provides earlier plants

grown trailing variety will cover twenty to twenty-five square yards.

Seeds are sown in small pots singly in early April and brought on under glass, but they may be sown out

Early in the summer Vegetable Marrows often fail to set their fruits, and produce a large number of male flowers. These should be picked off as illustrated

of doors at the end of April, and generally do better if grown in this way. They are often grown on mounds, but they do as well, or better, if grown on the flat.

Take out the soil, put in a small barrow-load of warm, greasy manure, and cover with 6 in. of soil. Scoop out a kind of basin in the soil, and put in three seeds. Place a bottomless box covered with glass over this. When the plants show above the soil leave only the strongest and protect till all danger of frost has gone. Nip out the l before the plant begins to run and train the shoots later on so that they do not cross. The marrows should be cut before they get to a large size, and then the plant will keep on producing them.

See that the plants get plenty of water.

CHAPTER XV

Salads

Lettuce.

Lettuce may be sown in February under glass and out of doors in March, April and May. A sowing of a hardy variety may be made in August to stand the winter, though this is not recommended on cold, damp soils.

When sown in frames the plants should be transplanted 3 in. apart in boxes, hardened off, and planted out in April with a good ball of soil. Leave 6 or 12 in. between the plants according to variety.

In summer the plants should be sown where they are to grow. If transplanted at this period of the year they are very likely to run to seed.

To get good crisp lettuce pinches of seed should be sown at frequent intervals and the soil should be well manured.

Radishes.

Radishes must be grown quickly or they will be tough and stringy instead of crisp and solid. Therefore see that they are grown in rich soil and supplied with plenty of moisture. They should be eaten while they are young. The olive-shaped radish is perhaps the most generally grown. French breakfast radish is one of the best sorts. There are also long or tap-rooted, and round or turnip radishes.

The latter are the best for sowing at mid-summer, when they should be sown in slight shade.

Sow in drills 1 in. deep, and do not sow thickly. Much radish seed is wasted in this way and inferior roots grown.

In mid-July make a sowing of China Rose. Thin out the plants, leaving them 3 in. or 4 in. apart. The roots are much larger than ordinary radishes. In November dig them up and store them in sand.

Mustard and Cress.

This is the most popular of all salads, and is very easily grown. It is sown very thickly and cut before the true leaves are formed.

It may be sown in fine soil just covering the seeds. It is more generally sown in shallow boxes, scattering the seed thickly on the surface of the soil, without any covering, and keeping it well supplied with water. It may be sown on flannel stretched tightly over a box, with one edge of the flannel dipping into water.

As mustard and cress is cut in the seed-leaf stage, there is no need to manure the soil. After the crop has been cut the soil may be dug up, made fine and levelled, and crop after crop raised on the same piece of ground.

Sow the mustard seed two or three days after the cress as it grows more quickly.

CHAPTER XVI

Garden Foes

PLANTS have many foes and suffer from the attacks of insects and from fungoid and bacterial diseases. As yet we do not know very much about the bacterial diseases, but as the importance of home-grown food is more and more realised, there is no doubt that science will find remedies which will enable the gardener to fight with greater success against the ravages of both insects and diseases of all kinds. There is no doubt also that new varieties of the plants we now grow will be raised which will either be immune from, or at any rate will resist, these attacks to a greater degree than do the plants which we now possess.

No gardener is exempt from the trouble caused by these pests, and each one has to wage continual war against them, anticipate their attacks, and defeat them. The same pests attack both weeds and cultivated plants, and often use the former as jumping-off ground from which to attack the latter. See therefore that no weeds are allowed in the garden. "Prevention is better than cure." Plants that are strong and vigorous are not nearly so liable to attack as weak plants are, therefore by good cultivation and good feeding keep plants growing vigorously. Inclement weather often checks growth. When this happens keep a sharp look-out for pests and attack

them at once. "A stitch in time saves nine." Whether the pests be of insect or other origin they multiply so rapidly that unless prompt action is taken irreparable injury to the growing crop will be done, and the gardener will reap a very poor return for all his labour.

The damage done by these pests is by old gardeners put down to blight, and looked upon it as something which could not be helped. This is altogether the wrong spirit. If anything goes wrong in gardening we must never be satisfied till we have found out both what is wrong and the remedy for it.

If plants in a garden suffer from attacks by insects or diseases one year, it is most probable that they will be attacked by the same pests the next year unless action is taken to prevent this. The pupæ of the insects or the germs of the disease will lurk in the ground or on the plants ready to begin work again as soon as conditions are favourable to them.

It is likely that in future general action will be taken to prevent the spread of the worst of these pests. Already the presence of "black scab" in potatoes has to be notified to the Government.

It is not much use for a gardener to try his utmost to check ravages of any sort if his next-door neighbour does nothing.

A visit to the Natural History Museum, South Kensington, to see the display of insect pests, will be most interesting and instructive, and such a visit should certainly be made by all school gardening classes in London, as well as by allotment holders and cottage gardeners.

CHAPTER XVII

Insect Pests

Most insects pass through four stages of existence. They exist (1) as eggs, (2) larvæ—caterpillars, grubs, maggots, (3) chrysalides or pupæ and (4) perfect insects (imago, imagines).

It is in the second stage chiefly that insects do the most harm. The perfect insect is generally harmless to plants. The most notable exception to this rule is the Aphis (green-fly or plant louse of all kinds) which does most of its destructive work while in the perfect stage.

Insect pests may be placed in three classes according to the way in which they carry on their work.

(1) Sucking.

(2) Leaf-eating.

(3) Mining—either in leaf, stem, root or fruit.

To No. 1 belong the aphides or plant lice. Insects breathe through pores or tubes in the body. If these pores are stopped up the insects die. The most common ingredient in insecticides is soap of some description. Nicotine and paraffin are both deadly to this class of insect life.

No. 2 class are generally killed by poison. In this case we use arsenate of lead, Paris green and hellebore powder.

No. 3 class get inside and cannot be reached by insecticides. In this case we take steps to drive off the

Aphides and Ants

insects before they lay their eggs by using strong smelling materials which they do not like.

Aphides (Plant Lice).

These are commonly known as green- or black-fly. There are many kinds, and there are few plants that do not suffer from their ravages. They are the most widespread of all insect pests and are generally found on the tender growing points, i.e. just the place where they can do the most harm. Not only are they found on the stems and leaves, but also on the roots of plants. The lice are soft-skinned, with antennæ generally longer than their bodies. They are provided with sharp, strong beaks, which they thrust into the bark and suck out the juices or food of the plants. The earliest green-flies are produced from eggs laid in the autumn. Kill green-fly in autumn, and you will most likely prevent attacks in the spring. The larvæ differ very little in appearance from the perfect insects. They develop quickly and the insects are females, winged and wing-less, which produce live young. They multiply so rapidly that in a few days the progeny of one green-fly will number hundreds of thousands. The winged insects spread the plague. In autumn winged male insects appear, and before winter kills them the female insects lay eggs which hatch out the following spring.

Looked at under a microscope the insect appears most formidable, and it certainly does an immense amount of damage. The insect damages the plant in two ways—(*a*) it sucks out the sap, which is the plant's life blood, thus stealing the material which is intended to build up the plants, and so cripples their growth, and

(*b*) it clogs up the stomata of the leaves with its excrement and honey dew, and thus prevents the plants from breathing and obtaining carbon from the air. Thus it cripples the growth in another way.

The honey dew is secreted by the insect by means of two small tubes on the upper part of the abdomen. It is a sticky substance and may be seen in patches, sticky to the touch, on the leaves. This honey dew traps the spores of various fungi, and thus fungoid diseases are set up in the plant.

Ants are very fond of this honey dew. It is said that with their antennæ they tickle the green-fly in order to make them exude honey dew, and so the aphis is known as the "honey cow." Ants are said to carry the fly from plant to plant, and even to carry them to their nests, where they place them on the roots of plants and thus are able to enjoy their favourite delicacy at home.

To get rid of the green-fly the ant too must be banished. To kill ants pour boiling water into their nests, or soak a sponge in sugar syrup, put it near the [illegible] and when the sponge is full of ants drop it into [illegible]ing water. If the ants are under or near the roots of a plant, make a hole with a dibber into the nest, and into the hole pour ½ oz. of bisulphide of carbon, and cover with soil. The fumes from the liquid will kill all the ants.

Bisulphide of carbon is very inflammable, therefore no light of any description must be brought near it.

The Spittle Fly (Froghopper or Cuckoo Spit).

In the axils of leaves a froth or spittle may often be seen in late spring or early summer, and if this be

removed, a green-fly, or perhaps more, will be found, something like an aphis. If you do not see this fly at once look on the farther side of the stem, where it will be found hiding. This fly, like the aphis, feeds by sucking out the juices of the plant. It is the larva of

Spittle Fly.—*a*. Spittle. *b*. Insect. *c*. Larva

the froghopper. This small brown insect, found on the plant later, gets its name from its habit of jumping like a frog when it is touched. The larva uses the spittle for its own protection. If the spittle fly is not destroyed it cripples the growing points of the plants. It is best destroyed by crushing it between the stem and the fingers.

It may be destroyed by an insecticide if the plant is first syringed with clear water, to clear away the spittle and the insecticide applied immediately afterwards.

CHAPTER XVIII

Soil Grubs

The Wireworm.

This is one of the worst pests the gardener has to contend with, but luckily it is only found in large numbers in newly broken-up pasture land.

It is the larva of the skipjack or click beetle, and gets its name from its appearance, which resembles a piece of copper wire. It exists in the grub or caterpillar stage for three or four years and, by attacking the roots and stems of most vegetables, does great damage, and in some cases entirely destroys the crop.

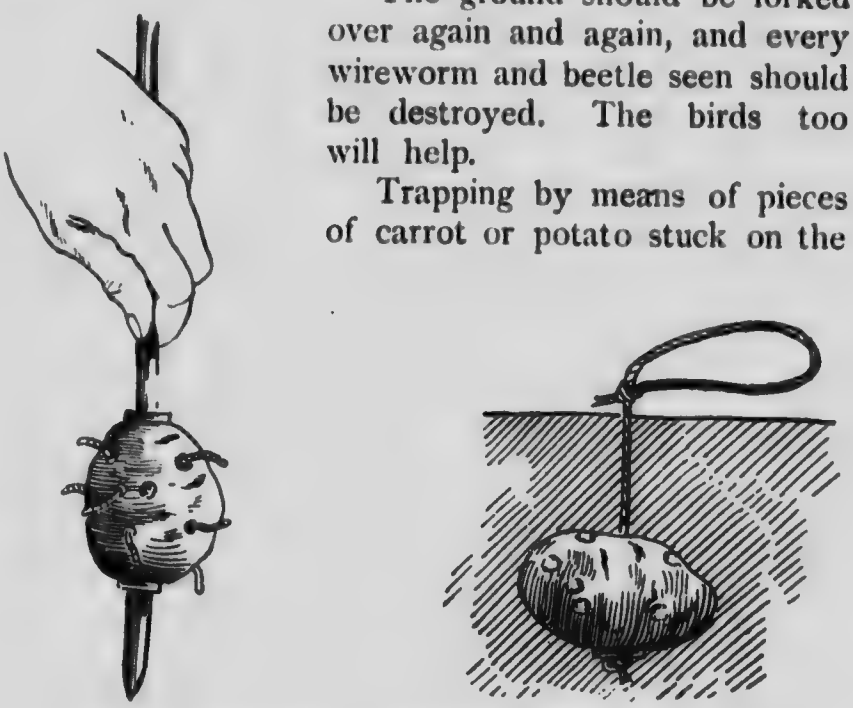
Gaslime spread on the surface of the soil at the rate of 2 lb. per square yard, allowed to lie there four or five weeks, and then dug in, is said to be the most effective remedy. This operation must be carried out in winter, as the ground cannot be cropped till three or four months later. Gaslime is as deadly to vegetable life as it is to insect life, but it is

a. Click beetle or skipjack. *b*. Wireworm. *c*. Pupa. *d*. Wireworm attacking carrot

now difficult to obtain. Soil fumigants, lime and soot are said to be of use in ridding the ground of this pest, but, in my opinion, this is doubtful. They, doubtless, are distasteful to the grub, and may cause it to move elsewhere.

The ground should be forked over again and again, and every wireworm and beetle seen should be destroyed. The birds too will help.

Trapping by means of pieces of carrot or potato stuck on the



Traps for wireworms.—potatoes or carrots sunk in soil

end of a wooden skewer and sunk in the soil will enable the gardener to kill many of these objectionable pests. The traps should be examined frequently, when the pests will sometimes be found sticking to the piece of vegetable, but more often will be found in the soil near it.

In the early stages of its existence the wireworm is sometimes white.

The Leather Jacket.

The leather jacket is the grub of the daddy long-legs or crane fly, and it gets its name from its tough, wrinkled skin, which requires a good deal of force in order to break it. Daddy long-legs may be seen in the autumn flying about on grass land in scores. The female has a long ovipositor at the end of the abdomen, and lays her eggs in the ground, generally among the roots of grass. The grubs or caterpillars which hatch out from these eggs are small at first, but they

Daddy Longlegs and its larva, or grub, the Leather-jacket

have tremendous appetites. They grow and grow, splitting coat after coat till they become an inch or so long, and are nearly the colour of the soil. They feed generally at night, just under the surface of the soil, devouring the stems and roots of young seedling plants, e.g. cabbages, lettuces, asters, etc.

If you find a choice seedling dying, poke round the roots with a stick. You will most likely find more than one leather jacket, and, at any rate, you will find some satisfaction in "squashing" them.

Like the wireworm, leather jackets are often very

numerous in newly broken-up grass land, especially in the damp parts of the field.

On lawns they may be killed by rolling the grass at night, as they come to the surface then. Constant forking and hoeing will bring them to the surface of the soil, to be killed by the gardener, or to be eaten by the birds.

Cockchafer Grub

The Cockchafer Grub.

This is the grub of a large beetle about an inch long which often flies into people's faces at night. The grub is dirty white in colour, nearly the thickness of one's little finger, and the end of its tail is swollen into a thick cushion. It is generally found curled up. It spends three or four years in the grub stage, and during that time feeds voraciously on the roots of plants, doing immense damage both in the garden and on the farm. Every grub found should be killed. The use of soil fumigants is said by some gardeners to rid the ground of this pest.

Slugs and Snails.

These creatures are close relations. The snail has a shell, while the slug has none. The former works entirely on the surface, while the slug carries on its work of destruction both above and below ground. They both secrete a thick slimy substance or mucus, and both are produced from eggs. These are round, white and shiny. They are often found when digging, and should always be destroyed. Lime and soot should be liberally dug into slug-infested soil, and dusted freely on the ground, especially among seedlings. This

should be repeated after a shower. Dry, fine cinder ash dusted round plants is also a protection. Heaps of bran or brewers' grains entice these pests. They can then be collected, and killed by dropping them into strong brine. VTH slug traps are also useful. Another very useful remedy is to place two tablespoonfuls of ammonia (·880) in a pail of water, spray the ground with this mixture in the evening, as slugs are night feeders. The slugs will escape by emitting mucus. After an interval of about 20 or 30 minutes spray again. This time the slugs are unable to manufacture enough mucus to enable them to escape, and they are killed. The ammonia will do good rather than harm to the plants, as it contains nitrogen. This should be repeated, especially on damp evenings.

Snails are easily found. Search for them among edgings. Get rid of all rubbish heaps, in which they like to hide.

During winter the snail closes up its shell with a kind of skin, and sleeps. It leaves a breathing hole in the skin. If you find a snail in the winter see if you can find the breathing hole.

One kind of slug, the Tectacella, is a friend to the gardener. It is rather large, yellowish in colour, and has an embryo shell on its tail.

In addition to the grubs mentioned in this chapter, there are various kinds of millipedes, or false wireworms. These can easily be distinguished from the true wireworm by their numerous legs. The wireworm, like most caterpillars, has only six legs.

Soil fumigants, soot, or anything which makes the ground unpleasant, will drive these pests away.

CHAPTER XIX

Garden Friends

It is very necessary for the gardener to distinguish his allies from his enemies, and to be certain while waging war on the latter, that he does not injure the former.

A few of his friends can easily be recognised.

The Worm.

The worm is one of Nature's gardeners, and is its chief agent in aërating and pulverising the soil. They live on the vegetable matter in the soil, and, to obtain this, they swallow the soil in immense quantities, bringing it to the surface in the form of worm-casts. The soil, during its passage through the worm's body, is broken up into very fine particles. It is estimated that once in fifty years the whole of the top 10 in of untilled land is brought to the surface by worms, and thus exposed to the action of the air. Thus they do the same work as man does when he digs or ploughs up the soil. By tunnelling, they expose more soil to the action of the air, and thus make the soil more fertile. Their tunnels benefit the soil by improving the drainage, and they also make it easier for the roots of plants to penetrate the soil. In fact, we might call the worm "Nature's Ploughman."

It is said that when wandering tribes in some

parts of Africa find earthworms in the soil, there they stay, because they know that the soil in that particular spot is fertile.

The Devil's Coachhorse.

This is a beetle of very fierce appearance, and is well known from its habit of turning up its abdomen and squirting out an evil-smelling liquid when interfered with. It is quite harmless, and a good friend to the gardener, because it feeds on his foes—wireworms, etc.—in the soil. It should never be destroyed.

Devil's Coach-horse

Frogs and Toads.

Frogs and toads are good friends to the gardener, and should never be destroyed. Toads are especially useful. If you see a toad in the garden, watch it carefully. You will most likely see it throw out its tongue and catch an insect. The tongue is sticky, and its root is at the front of the mouth.

The hedgehog is another ally.

a. Ladybird. *b.* Larva. *c.* Larva enlarged

The Ladybird.

Everybody knows the ladybird, with its pretty black-spotted wing cases. There are several kinds. Wherever green-fly are to be found, there will lady-

birds also be found. Everybody knows the lady-bird, but very few know its larva. The larva is a queer-looking little thing, and, owing to its shape, it is sometimes called a crocodile. Both the insect and its larva feed on green-fly, but the larva eats more than the insect does.

Hawk Fly

Hoverers and Lace-Wing Flies.

Flies may be seen hovering like hawks over plants in the garden during the summer time. Some are somewhat like small wasps. All these are friends, and should not be destroyed. They are either hawk or ichneumon flies.

The lace-wing fly gets its name from its greenish gauzy wings. It has a very slender body, and once seen is not soon forgotten, as it is so pretty.

The larva of the hawk-fly devours aphis, while the ichneumon fly lays its eggs in the bodies of caterpillars. When the eggs hatch, the larvæ feed on the bodies of the caterpillars and destroy them.

a. Lace-wing Fly.
b. Larva. *c.* Eggs.

Fungoid Plant Diseases.

Plants are attacked by many fungoid diseases. The ordinary potato disease has already been mentioned.

Another, and perhaps the commonest fungoid disease, is "mildew," which, in various kinds, attacks many plants. All fungoid diseases are spread by means of spores, which are very light and are carried about by the wind. These spores (seeds) fall, in some cases, on the leaf of a plant. If the leaf is damp, the spore sends down little tubes which pierce the skin, and the baby fungus or mycelium spreads quickly through the leaves, robbing them of the food they are manufacturing for their own plant, and preventing them from carrying on their work. The leaf becomes covered with a white powdery looking substance, dies, and falls off.

Spraying with Burgundy or Bordeaux mixture will very greatly help to prevent fungoid attacks, but it is almost impossible to cover every leaf completely, and so loopholes are left by means of which the disease is able to attack some plants. Neither of these mixtures will cure the disease, and it is of no use to apply them once the plant is attacked. Sulphur in some form must be used to cure mildew, and the best way to apply it is to dissolve ½ oz. potassium sulphide (liver of sulphur) in a gallon of water, and to syringe the plants several times, at intervals, with this solution. The solution should be freshly made each time it is applied.

All diseased leaves should be collected and burnt or the disease will lurk in the ground during the winter, and when the warmer weather comes spores will be sent out to spread the disease again.

CHAPTER XX

Propagation by Cuttings

MANY plants are propagated by cuttings. This is an easy way of producing plants either to make new plantations or to replace trees that are worn out, and is practised in both fruit and flower gardens.

Flowers, bushes, like red, black and white currants, and gooseberries, are generally raised from cuttings taken in the autumn. The first week in October is a good time. Other hard-wooded plants like roses (generally raised by budding), apples, pears and plums may also be raised from cuttings, but in the case of the latter three, grafting is the usual method as it gives quicker and better results.

The cutting is made from half-ripened wood of the present year's growth, and should be about the thickness of a lead pencil. Old wood, or soft sappy young wood, will not strike. Cut off the tip just above a bud, and then cut off the shoot just below a bud, or, in the case of roses, take the cutting with a heel, that is a thin slice of the branch from which the shoot springs. This is not really necessary, though some gardeners say that cuttings taken in this manner root better. N.B.—The knife must be sharp.

Cut out all the lower buds, leaving three or four only at the top in red and white currants, gooseberries, and any cuttings that will be used as stocks for budding or grafting. This will prevent suckers from

growing, but do not cut out the buds in cuttings of roses and black currants. The cuttings should be about 6 or 7 in. long.

Plant the cuttings two-thirds of their length in

Rose Cuttings.—Method of planting

the ground, which should be firm but not recently dug. Take out a trench with a spade, put 2 in. of clean sand in the bottom, stick the cuttings into this about 6 in. apart and fill in the trench with sandy soil, being especially careful to make the cuttings firm. In winter the frost often lifts the cuttings. After a thaw go over them and push them

down. Make the bed for cuttings in a shady place—on the north side of a wall is a fine situation.

Do not disturb the cuttings till the next autumn.

Soft-stemmed plants, like violas, penstemons, snapdragons and calceolarias, need the shelter of a cold frame. Make these cuttings 3 or 4 in. long, cut immediately below a joint, and remove the lower leaves. They may be planted either in boxes or in the ground. Make a hole with a small dibber, put in a pinch of sand and make cutting firm. If you fail to do this the cutting will not grow. After planting, test by giving a slight pull. If the cutting comes out it has not been planted firmly. Water with a fine hose.

Keep the frame closed for a fortnight and then gradually admit air. The lights should be closed at night during the winter, but during the daytime, except in foggy or frosty weather, there should always be a little ventilation. Protect frame in very sharp weather with mats.

To get bushy plants, except in the case of violas, pinch out the tops late February or early March.

Geranium cuttings taken from the soft tips may be struck in the open ground in July. Use a little sand and plant them in the full sunlight.

By using a sharp knife, and by firm planting in light soil, you are certain of success.

When cuttings are taken in warm weather, except in the case of geraniums, they must be kept close, i.e. put in a closed structure, e.g. a frame or a box, or flower-pot covered with glass to prevent evaporation. If this is not done, the leaves quickly wilt and the cuttings die.

CHAPTER XXI

Propagation by Layering

WHEN this method can be adopted, it is a more certain method of propagation than by cuttings. It can, however, only be adopted where stems can be bent down under the soil, and is usually adopted to supply stocks, on which to graft apples, pears, etc. It is most commonly used for the propagation of carnations, but

Layering Carnations

climbing roses are quickly and easily raised in this way.

Whether tongueing, ringing, or notching is used, the object is the same in each case. The downward flow of sap is arrested, and a callus is formed at the cut, from which new roots are emitted. When this has happened, the young plant is severed from its parent and planted in its permanent position. For carnations the work is done in July, and in autumn for hard-wooded plants. The layered shoot is firmly fixed in position with a peg placed on the side nearest the

parent plant near to the cut. The stronger the shoot, the stronger must be the peg. It may be made of either wire or wood.

Tongueing.

In this case a slanting cut is made partly through the stem, which must pass through a node. The peg is put in position and the end of the shoot bent upwards—this opens the cut. Some gardeners fasten the end of the shoot to the peg. A handful of sand is placed over the cut which is then covered with a little mound of soil. This should be kept moist. In the case of cuttings the young plant will be well rooted by October.

Ringing.

In this case a ring of bark ¼ in. is cut out round the branch, which is then treated as if tongued. This method is often adopted in hard-wooded pot plants which have lost their lower leaves and become leggy. A ring of bark is taken out, a flower-pot is cut in two and fastened in position round the cut. The pot is filled with moss or sand. This is always kept moist. New roots are emitted, and the plant cut off the old stock and potted.

Notching.

This is simply cutting a small **V**-shaped notch just behind a node and then covering the branch with soil. In some soils a branch pegged in position and covered with soil will often root without using any of the three methods mentioned.

CHAPTER XXII

Propagation by Budding

In the axil of every leaf there is a bud, which, under favourable conditions, will develop into a shoot. Some of these buds are plainly to be seen, while others are dormant. Budding is a method of propagating plants by bringing the inner bark of the bud of one variety, called the scion, in contact with the inner bark of a similar species, which is called the stock. For instance, we bud a rose on to a wild rose; an apple on to the wild crab, i.e. bud and stock must be of the same species.

Budding is the most frequent method of propagating roses, but apples, pears and plums may also be budded.

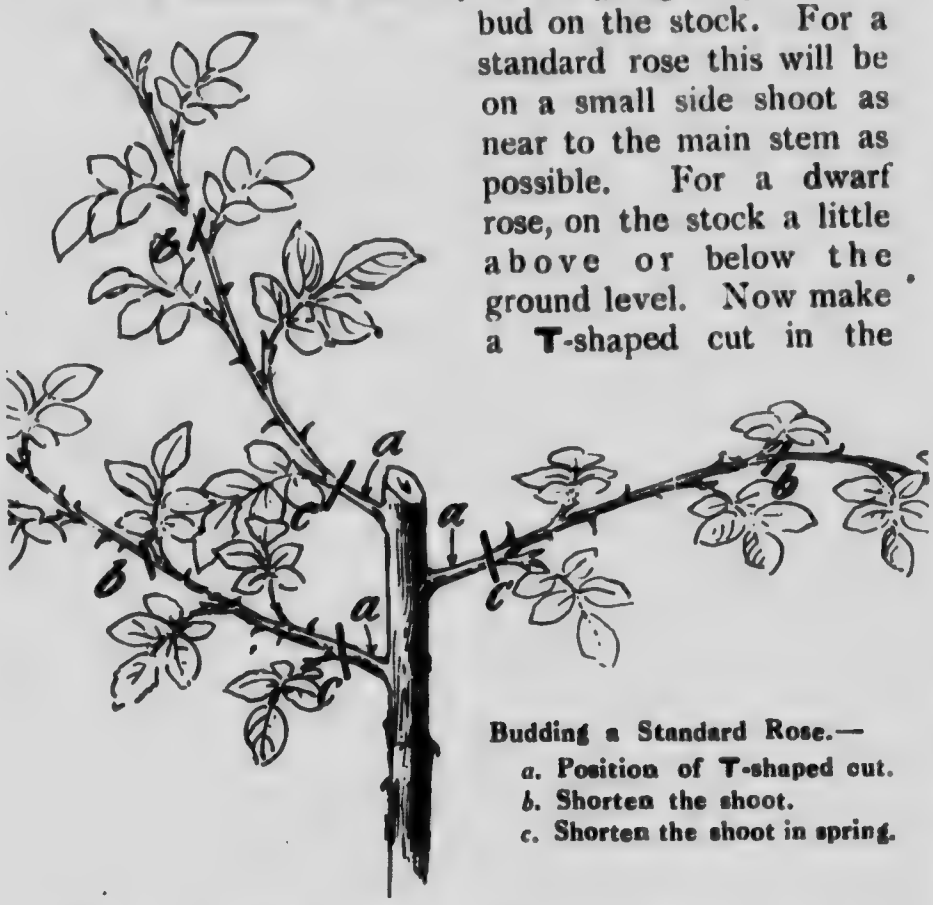
Showery weather in July and August is the best time for budding.

The buds should be taken from half-ripened shoots. In roses shoots that have just borne a rose are best. The buds should be plump, not elongated. Cut off the shoots from which

1. Trim off the leaf

you are going to take the bud, and trim off the leaves, leaving only a short leaf stalk by which to handle the bud (1).

Now determine where you are going to place the bud on the stock. For a standard rose this will be on a small side shoot as near to the main stem as possible. For a dwarf rose, on the stock a little above or below the ground level. Now make a T-shaped cut in the



Budding a Standard Rose.—
a. **Position of T-shaped cut.**
b. **Shorten the shoot.**
c. **Shorten the shoot in spring.**

bark, and be sure to cut through the bark, but not half way through the wood as well. Now with the bone handle of your budding knife placed just where the two cuts in the bark meet, raise the bark on both sides of the cut (if you have not a budding knife a sharp pen-knife will do, and the handle of a tooth-brush sharpened

and smoothed will be a good substitute for the budding knife handle).

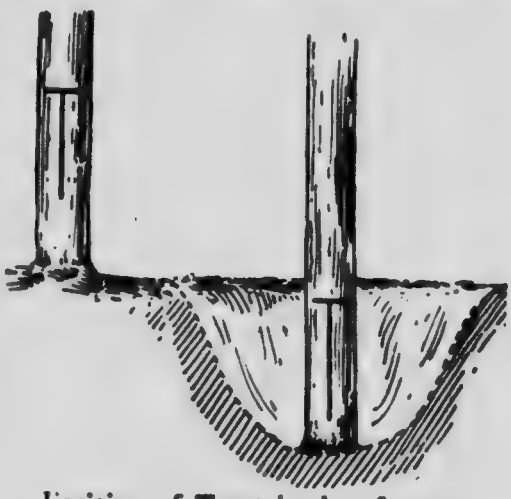
Now take the shoot from which the bud is to

Cutting out bud | Raising the bark | Inserting the bud

be taken, place the growing end towards you, and then, placing the knife about ½ in. behind the bud, make a boat-shaped cut to take out the bud. Now with the bark and bud you have also a thin slice of wood. Remove this, being careful not to remove the base of the bud, or the bud will not take. If there is a little hole at the back of the bud, throw it away and try another. Many people find very great difficulty in removing the wood without removing the base of the bud, and overcome

the difficulty by cutting out the bud with the thinnest possible slice of wood. The bark is now lifted, and by taking hold of the bud by the leaf stalk, it is slipped under the bark of the stock. If part of the bark projects, cut it off level with the cross cut of the T-piece. See that the bark of the stock is over the bark of the bud. Take a piece of broad raffia which has been wetted and straightened out, place the middle of it on the opposite side to the T-cut, bring the raffia round and cross just behind the leaf-stalk of the bud, and then round again just in front of the bud. Cover up the whole of the cut. Tie firmly but not too tightly. In a few days you will see by the appearance of the bud whether it has taken or not. If the bud keeps green all is well, and in a month loosen the tie to allow the wood to swell, but retie. It is best for the bud to remain dormant till spring. In spring shorten the shoot on which the bud is growing, and when the bud starts into growth, cut the old shoot right down to the T-cut. Support the

Tie in bud with raffia



Position of T-cut in dwarf roses

new shoot or it will most likely be blown out of its socket.

In the case of standard rose trees, buds may be placed on two or three shoots. Leave all shoots on the stock whether budded or not. The tree has just sufficient roots to support all the branches it makes. If some of the shoots are removed at the time of budding, the buds may be forced into growth almost at once. If these growths are not removed till spring or at any rate till growth is dormant, then all the vigour of the plant will be thrown into the new buds, which will grow strongly and produce a vigorous plant.

CHAPTER XXIII

Propagation by Grafting

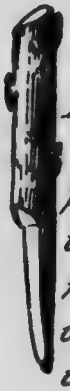
GRAFTING is the method most generally used in the propagating of fruit trees. It simply means taking the branch of one tree and getting it to grow on another. This shoot is called the scion—the tree on which it is to be transplanted is called the stock. Both tree and stock must be of the same species, e.g. you would not graft a plum on a crab stock.

The spring, about April 1st, is the time for grafting.

If you take a growing shoot, and pull off the bark, the wood underneath is sticky with sap and the inner bark also. This is the cambium layer, and it is the only part of the stem where growth takes place, and whether in budding or grafting, this cambium layer of the scion must be brought into contact with the cambium layer of the stock before the two can grow together.

The scions of the tree to be propagated are cut off in January or early February, and if old and inferior trees are to be grafted they should be shortened back in February. The scions should be labelled, tied together, placed upright in the ground on the north side of a wall or hedge, and nearly covered with soil. In spring the sap begins to rise. The object in placing the scions in the shade is get the stocks in a more forward state than the scions.

How the scions & stock are prepared for whip grafting. method used when stock is small.



Tongue grafting, a variation of whip grafting

There are several methods of grafting, but the two most generally used are :

(*a*) Whip and tongue grafting.

(*b*) Crown and rind grafting.

The former is used when scion and stock are of the same thickness, and the latter when the scions are to be grafted on old trees.

Crown or — rind grafting the best method to follow with old trees.

In whip and tongue grafting, the stock is cut off as near to the ground as possible, just above a bud, and the scion is cut off just above a bud at the top and just below a bud at the bottom, and each scion should have four or five buds.

A slice is taken off the scion, taking care not to cut off the bottom bud, and a corresponding slice off the stock, and similarly a tongue is cut in the one and a corresponding tongue in the other. The scion is then put in its place. As it is very unlikely that the two are of the same thickness they should be made to fit exactly on one side so that the cambium layer of the one is brought into contact with the cambium layer of the other. The two are then bound together firmly, but not too tightly, with raffia, and covered with grafting wax to exclude the air and prevent evaporation.

Crown and rind grafting is used in grafting older trees, and thousands of trees now producing inferior apples could be made valuable in this way. The opera-

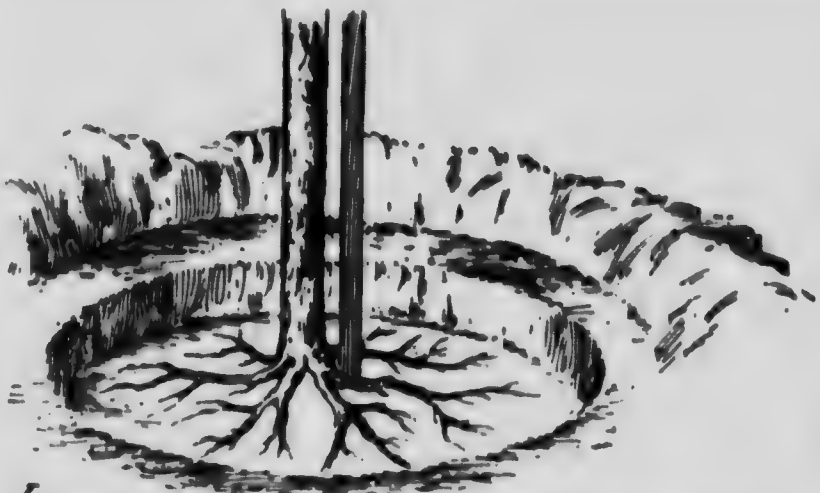
tion is very simple and many amateurs are successful with their first trial.

The trees are cut back as stated and the ends pared smooth with a sharp knife. A cut 1½ in. long with a sharp-pointed knife is then made through the bark, down one side. The edges of the bark are raised either by tapping in a small chisel or by the wedge-shaped handle of a budding knife. The scion about 4 in. long with a bud both at the top and bottom is then pared down at the lower end so that it will easily slip under the raised edges of the bark. It is sometimes cut with shoulder (*a*) to rest on the wood of the stock, but it will not unite at that point.

The graft is then tied firmly in its place and the whole finished by painting warm grafting wax over it to exclude air. Instead of wax the whole is sometimes covered with a mixture made of clay, cow-dung and chopped hay.

The grafting wax may be made by melting in a pot over the fire 4 parts resin, 2 parts beeswax, and 1 part tallow. Apply this while it is warm and it will set hard almost immediately.

Both in budding and grafting the new shoots should be prevented from blowing out by tying each to a small stake fastened both to stock and scion.



In making holes for fruit trees, allow plenty of room so that the roots can be spread out

This kind of planting leads to poor results.

CHAPTER XXIV

Planting Trees

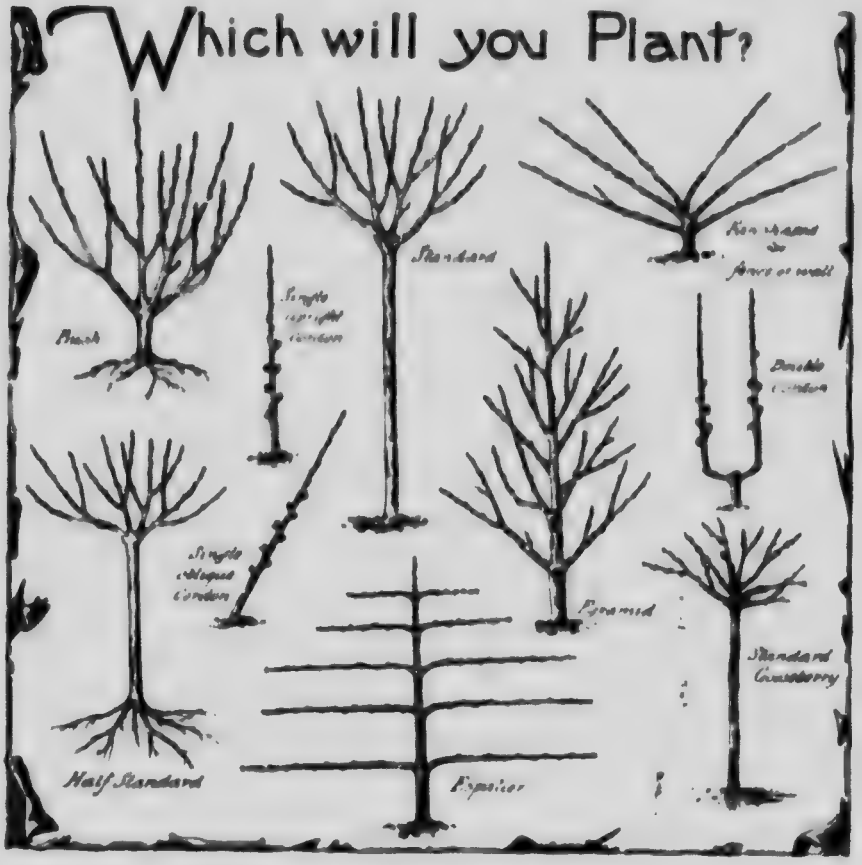
TREES are generally planted just before they are entering into their dormant period, when growth has stopped and the leaves have fallen.

Early November is about the best time. The ground has still some of its summer heat left, and new roots begin to form at once. Care should be taken not to plant in frosty weather. If the planting is not done in November it is best to postpone the operation till early March, but do not plant in very wet soil. If the plants arrive in very wet weather heel them in and wait.

As the future of the tree largely depends upon the way it is planted, it is worth while to take trouble to see that this is done well. The ground should be trenched some time before planting is done, in order that the ground may settle. No manure should be used unless the ground is very poor. Take out a hole wider than the spread of the roots and about 6 in. to 9 in. deep. Notice the soil mark on the tree and be careful not to plant too deeply. Deep planting is a very common mistake and should be avoided. If you are planting a tall tree put in the stake first. Now trim any damaged roots with a sharp knife, cutting upwards not downwards. The bottom of the hole should be level or very slightly convex. Very often the bottom is made too convex and then the roots are given a

downward tendency, and this is just what is not wanted.

A tile or piece of slate placed under the roots in the



Various ways of training trees

centre of the hole will often obviate the formation of tap roots.

Place the tree in position, spreading the roots out well, not allowing them to cross. Cover the roots with fine soil, working it well in between the fibres. Make firm, but be careful not to damage the roots.

Now place a piece of cloth or leather round the stem and fasten the tree to the stake, but not too firmly, or the tree would be hung up when the ground sinks after planting. If the soil is light put on a mulch of manure, but if it is clay wait for the spring before doing so.

If planting against walls, plant at least a foot from the wall.

CHAPTER XXV

Training Trees

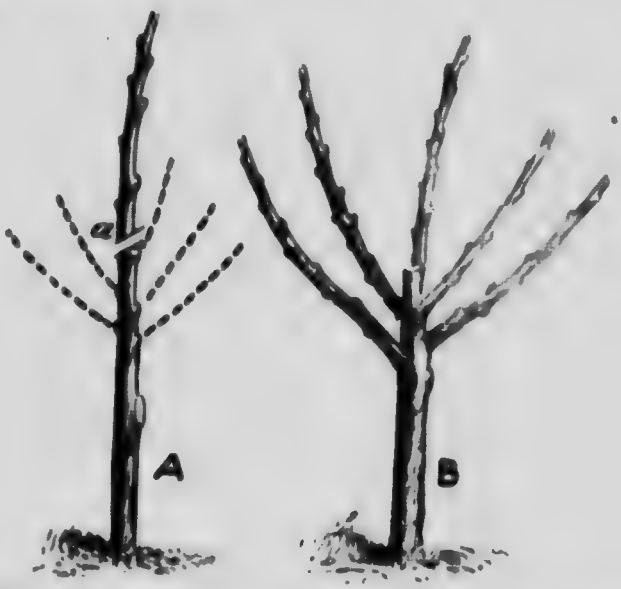
WHAT a child becomes in later years depends largely upon the way he is trained while young, and this is equally true of trees. If they are properly trained when young, they are easily managed afterwards.

When cutting back a branch, place the knife on the opposite side of the branch to the bud, and with a slightly slanting upward cut, bring out the knife just above the bud, which should point outwards. If a snag is left above the bud, this will die back to the bud, and be an eyesore. From this bud, and from two, three or four other buds below it, branches will spring out. If a branch has to be taken out altogether it should be cut or sawn close to the branch from which it springs. If sawn, the wound should be pared with a sharp knife and dressed with tar or some other antiseptic to prevent insects or spores of disease finding a home there.

1. Snag left. 2. Too low. 3. Cut to an outside bud—right. 4. Sloping towards bud—bad. 5. Sloping from the bud—correct

Fruit trees are grown in the open as standards,

half-standards, pyramids or bushes, and on walls either fan-shaped or as espaliers or cordons; and, of course, the method of training the young trees depends upon the form in which they are to be grown. In all cases keep the branches well apart to admit light and air, otherwise the result will not be satisfactory. Cut out all branches that cross.

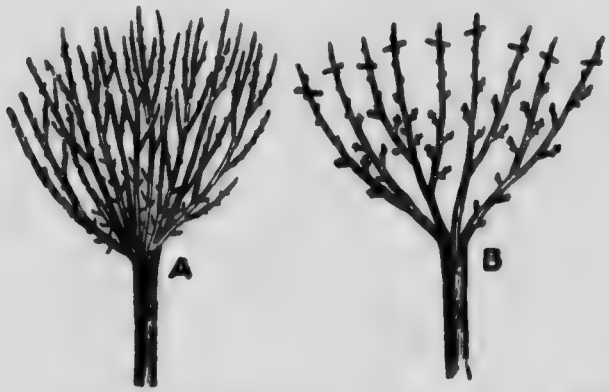


Training bush apple trees.—A. First year. B. Second year

To form a bush or pyramid from a young tree with a single stem, cut back the first season to within a foot of the ground. From the cut-back stem four or five branches will start. The next year cut these back half way, and you have the foundation of the bush.

Young standard trees should have their branches cut back three-quarters of their length the first year and one-third of their length the next. This will lay the foundation of a good head.

It will be seen that cutting back branches leads to the number of branches being increased, and if this were continued year after year, the trees would become a mass of twiggy growth, all leaves and no fruit, and so after a certain number of branches have



Pruning standard fruit trees.—A. Too thick. B. Correct. Prune at tips

been obtained, then we prune in order to get fruit, and adopt an entirely different method.

Pruning for Fruit.

Most fruit trees, except black currants and Morello cherries and peaches, produce their fruit on short spurs, and the more spurs we can get on a tree, the more fruit it will bear (with the permission of Jack Frost).

When dealing with a tree that has been neglected, it will be seen that the branches are too close together. Cut out some of the branches with a small saw, leaving the remaining ones at least one foot apart. Then cut out all branches growing inward and downward. All branches in fruit trees should grow

upward and outward, therefore always cut to a bud pointing in that direction. As a rule the strongest branch generally grows from that bud, and in the direction the bud points.

The middle of the tree is too often allowed to

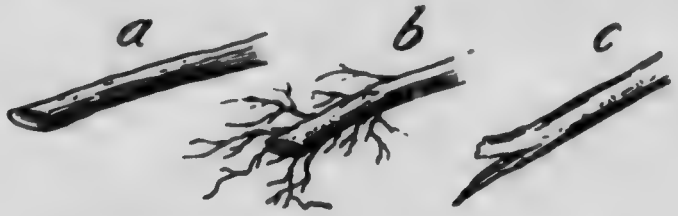
A. Young shoot (breastwood) pinched off below a leaf.
B. Shoot carelessly cut through the leaves—bad

become overcrowded, and this is generally so in currant and gooseberry bushes. Thin out the centre well, then the fruit will be larger, and easier to gather.

All fruit trees which bear on spurs are benefited by summer pruning. The side branches are pinched back in August to five or six leaves. This must not

be done too early or the buds will break into growth and form little twigs which are not wanted. The pinching-back stops growth, and the food which would have been used to make wood is used to form fruit buds. If a tree is examined in winter, two kinds of buds will be seen. One kind, round and plump, are fruit buds, and the other kind, long and narrow, are wood buds. In early spring these side shoots are cut back to 1 in.

Black currants, Morello cherries and peaches should not be summer pruned. On these trees as much of the old wood as possible should be cut



Cutting roots.—*a*, *b*. Correct. *c*. Wrong

away, and the young wood left, because it is on the young wood that fruit will be borne.

Sometimes a tree grows very vigorously, making a great deal of wood, but bearing no fruit. If young, it should be carefully lifted, its roots trimmed, and replanted. With old trees this practice would be too drastic, take up too much time, and might kill the tree. Take out a trench 2 ft. deep and 1 ft. 6 in. wide, half way round the tree, just as far from the trunk as the spread of the branches. Work underneath the roots, cutting all that can be found. Some gardeners do not agree with this entirely, but take great care of all the fibrous roots, and cut only

those roots which go down deeply. The hole is then filled in after mixing old mortar rubble and turfy loam

with the soil. If this has not the desired effect, then treat the other side in the same way the next year.

Root pruning should be done in October.

CHAPTER XXVI

The Apple

THIS is the most important fruit we have. It ought to be much more largely grown in this country, but we depend too much on imported fruit for our supply. This imported fruit has a fine appearance, but no imported fruit can beat English fruit in flavour. The apple has been grown for ages and was produced from the wild crab. There is an immense number of varieties, but before selecting trees for planting find out the varieties that do well in the neighbourhood and plant them.

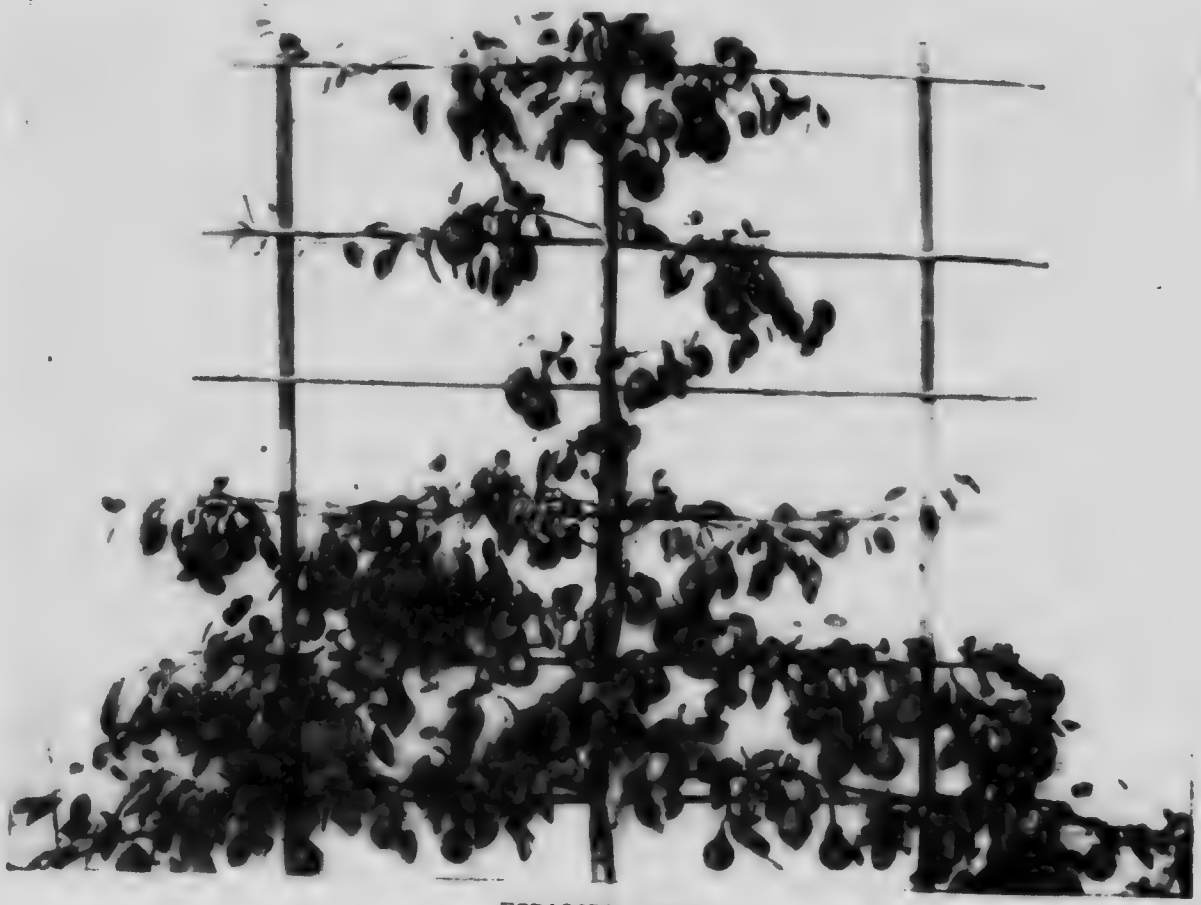
We use the crab stock for standard trees and the paradise stock for smaller bushes. The former make big trees for orchards, but are some years before they become profitable. The latter soon come into bearing; do not live so long, but are better for small gardens.

Grafting and budding are the methods of propagation generally practised, but apple trees may be grown from pips and from cuttings.

The apple tree has many enemies, both of insect and fungoid origin.

The Codlin Moth does a tremendous amount of damage. Everybody knows the grub-eaten apple. This is the work generally of the grub of the Codlin Moth.

The female moth flits about the tree and lays eggs on the young fruit. A grub soon hatches and immediately bores into the young apple and generally causes



ESPALIER TREE

it to fall before it is ripe. The grub either falls with it, or has previously let itself down by a silken cord. Immediately it reaches the ground, it makes its way to the nearest tree trunk, climbs it, and hides in a crevice. There it pupates, and emerges as a perfect insect in May to carry on its destructive work.

Remedies.

(1) Spray the trees immediately the petals of the blossom fall with arsenate of lead or Paris green. This poisons the young grub and destroys the pupæ.

Fruit damaged by apple saw-fly and codlin moth

(2) Spray with caustic winter wash while the buds are dormant. It is best to purchase this ready for use. This also clears the trees of lichens and moss.

Use it carefully—it burns both skin and clothing.

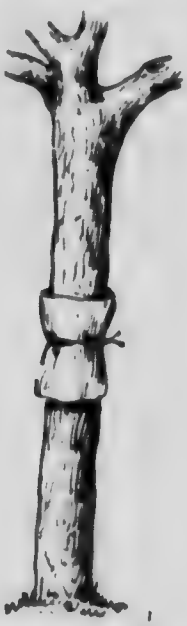
(3) Hay-banding the trees in late May. The grubs will pupate in the bands, which are burnt in early winter.

(4) Grease-banding. Grease-proof paper is tied tightly round the trunks with three bands of string. This paper is covered with cart-grease. This grease is

renewed when it ceases to be tacky. The bands are best kept on all the year round.

Winter moths of various kinds lay their eggs on the trees from October to March. These hatch out into caterpillars which feed on the leaves. Then they fall to the ground, pupate and afterwards develop into moths. The female moths are wingless and therefore have to climb the trees in order to lay their eggs. Grease bands catch all these. A winter wash destroys the eggs or arsenate of lead sprayed on the leaves when they first open poisons the caterpillars.

Grease-banding —correct way


Grease-banding —wrong way

American Blight or Woolly Aphis.

This is a form of green-fly which covers itself with a white downy substance. If this be removed the insects will be seen immediately underneath. Syringeing forcibly with paraffin emulsion is one remedy. Dipping a brush in paraffin or methylated spirit, and touching the white patches, will kill the insects. Tying the brush to a long stick will enable the operator to reach the higher patches. The insects on badly infested trees will also be found on the roots. Making holes round the trunk, and

pouring in ½ oz. of bisulphide of carbon will kill these. The insects disfigure the trees and the wounds caused by them render the trees liable to the attacks of various fungoid diseases, the spores of which find a home in the open wounds, and immediately proceed with their destructive work.

Canker.

This is a fungoid disease which attacks many fruit trees. The spores of the disease find a home in a crevice due to some injury, insect or otherwise, to the bark. The mycelium attacks the bark first, and then the wood, stopping the flow of the sap and gradually killing the branch. A young branch when attacked should be cut out at once and burnt. If a large branch is attacked, pare away all the diseased portions. Be sure to go far enough, as mycelium may be present in what appears to be healthy wood. Then paint the pared portion with Stockholm tar.

Canker.—A. Diseased patch. B. Cut away and dressed with tar

Gather up all dead wood under the trees and burn it.

CHAPTER XXVII

Bush Fruits

CURRANTS and gooseberries are generally known as bush fruits. They should be planted about 5 ft. apart, care being taken as before advised to plant properly. After planting, mulch with manure, but if on clay ground, postpone the mulching till the spring.

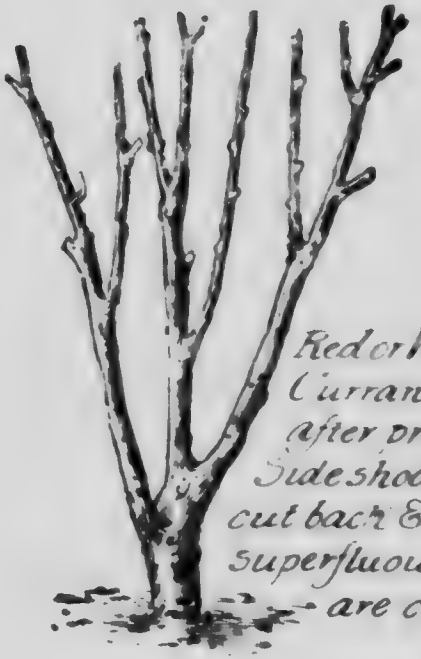
Black currants are pruned by cutting out the old wood and leaving the new.

Do not summer prune black currants.

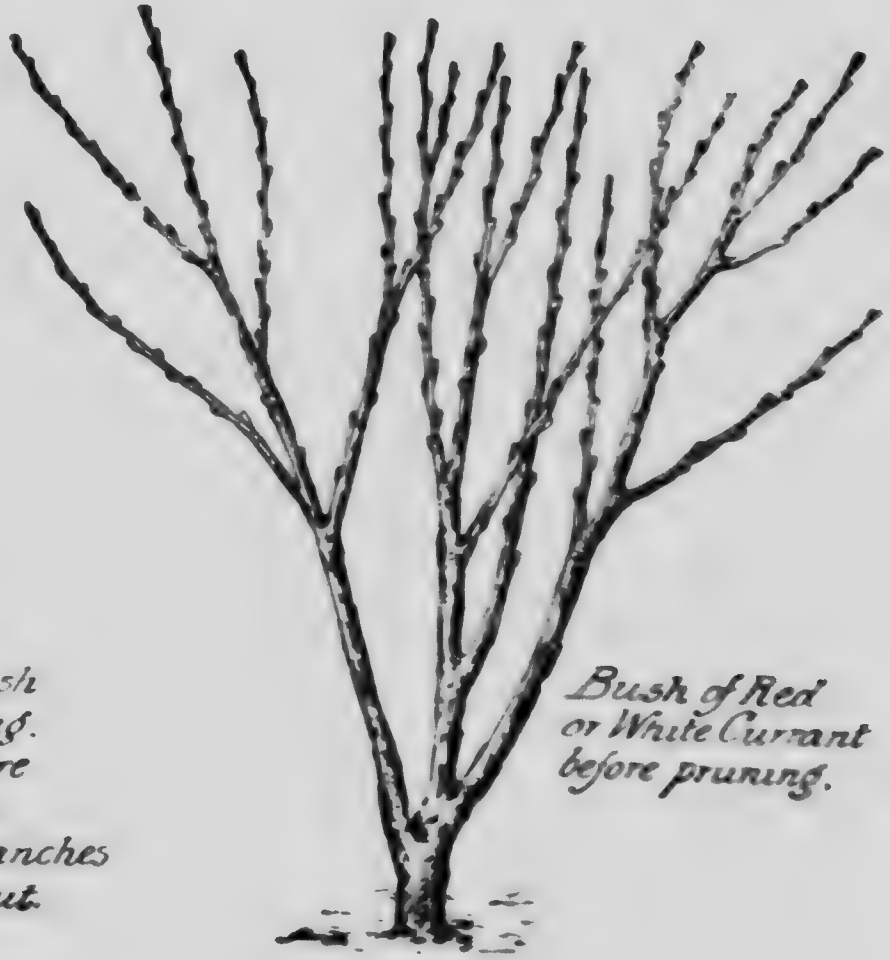
The great enemy of the black currant is the bud mite, or big bud. The mite, which is so small that it is invisible to the naked eye, causes the bud to swell into a little round ball, which, if once seen, is easily recognised. Cut off all buds and burn them. Dust the bushes while damp in April, May and June with sulphur and lime. This is the time when the mites migrate. Planting the trees closer together and cutting down alternate ones every other year is also recommended by some gardeners.

Big Bud. — A. Buds attacked. B. Healthy buds

Red and white currants and gooseberries should have the centres open, and the branches kept 9 in. apart. Summer prune in June and in spring cut back



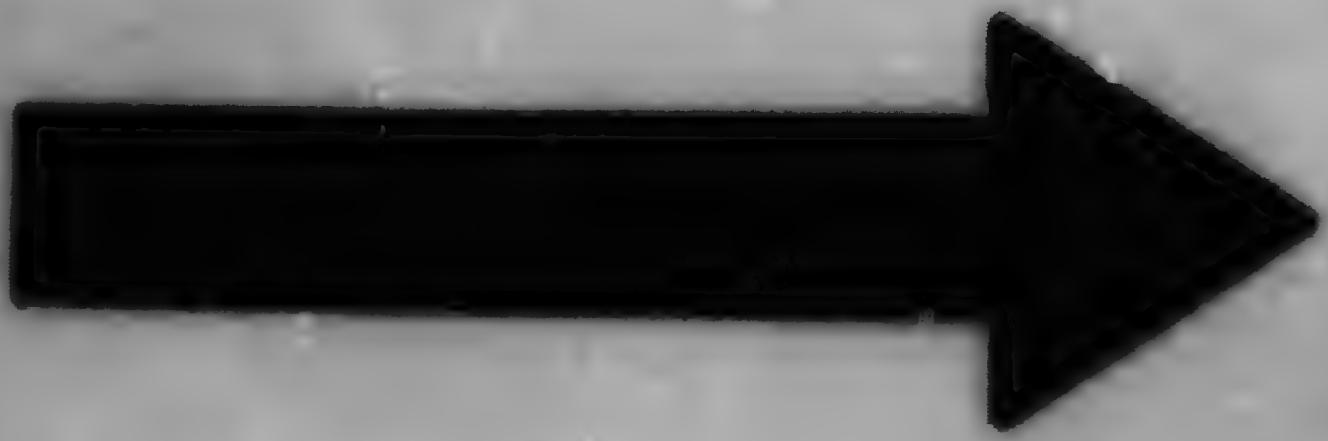
Red or White Currant bush after pruning. Side shoots are cut back & old superfluous branches are cut out.



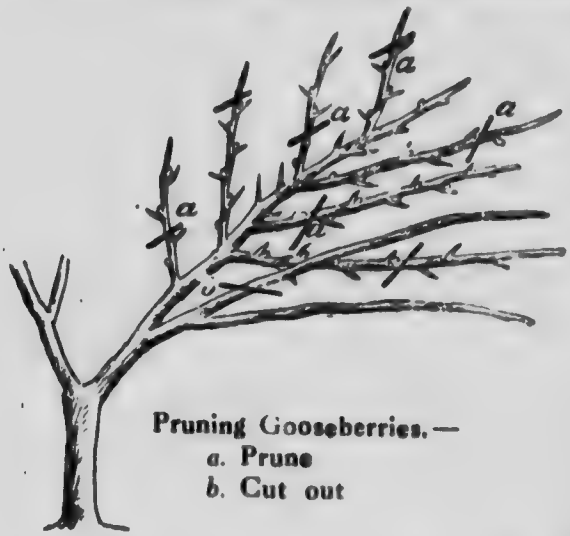
Bush of Red or White Currant before pruning.

Summer Pruning Red Currants.—*a*. Old fruiting wood. *b*. Young wood summer pruned, prune to *a* in winter

Black Currant Bush.—(A) before and (B) after pruning. As much old wood as possible is cut out to make room for last year's shoots



the side branches to one inch. Birds are very fond of the young buds, therefore postpone the final pruning till the spring. Where birds are very troublesome, branches of gooseberry bushes are often tied in a bunch in autumn with a strong cord.



Pruning Gooseberries.—
a. **Prune**
b. **Cut out**

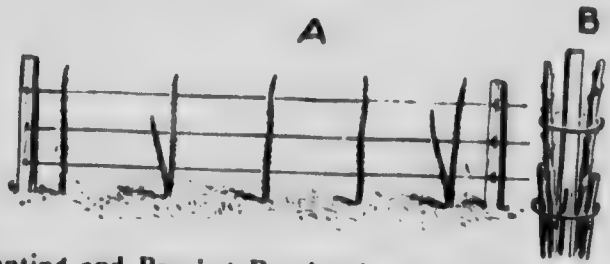
After pruning it is a good plan to drench the bushes with soapsuds, and then dust them well over with soot and lime.

Some growers thread the bushes with black thread. Gooseberry and currant bushes are often attacked by

B1. Magpie moth
B2. Caterpillar
B3. Pupa

caterpillars, those of the Magpie Moth especially, which clear the trees of leaves.

Syringeing the bushes with arsenate of lead solution,



Planting and Pruning Raspberries.—A. Planted singly against wires. B. Planted in clump. Pruned to different heights

dusting with hellebore powder, or, as the powder is poisonous, mixing it with water (¼ lb. to 1 gal.) and syringeing with this is safer.

After applying either of these remedies at least one month must elapse before the fruit is used.

Hand picking is another remedy.

Raspberries.

The raspberry is easily grown, very profitable, and delicious.

The raspberry is found growing wild in rather shady, damp positions. The plant has two sets of roots—deep roots which produce the wood and fibrous surface roots that feed the fruit. The plant does best where it is slightly shaded during the hottest part of the day, and

Raspberries. — Thinning after fruiting, old canes cut off at bottom. New canes tied to wire (×)

requires abundance of moisture. A mulching of well-decayed manure is most beneficial. Owing to its numerous surface roots the ground near the plants must never be deeply dug.

The plant is propagated from suckers which should be dug up with as many roots as possible and planted with the roots well spread out. Plant in rows 4 ft.

Strawberries.—A. Runners pegged in pots. B. Parent plant

apart, either in clumps of three roots 4 ft. apart, or in single plants 12 in. to 15 in. apart in rows. In the former case train to stakes, and in the latter to wires. Cut down the canes after planting to 6 in. to enable them to get well established. As the cane dies after fruiting, cut out the old canes immediately they have ceased bearing fruit, and thin out the weakest new shoots so that the young vigorous canes may be well ripened. In the spring cut off all side shoots, and in the clumps of not more than six canes, prune these to different heights, say 4 ft., 3 ft. and 2 ft.

The American blackberry and the loganberry, with its relations, all make long growths and may be trained to fences, stakes, or trellis work. Plant at least 12 ft.

apart. After planting, prune to 1 ft., and afterwards cut out the old canes immediately after fruiting, and tie in the new canes well apart so that they may be well ripened. Wherever the tip of a new shoot touches the ground it will root, and it is in this way that the plants are propagated. These plants, like the raspberry, want plenty of moisture, and show their appreciation of a good mulching of manure by yielding abundant crops.

Strawberries.—A. Rooted runner removed from pot and roots uncoiled. *a*. Point at which runner is cut. B. Planted. *b*. Hole taken out with trowel. *c*. Mulch of manure. Don't bury the crown

CHAPTER XXVIII

Cultivation of Flowers

THE cultivation of flowers, though not so useful as the cultivation of fruit and vegetables, must yet be practised in school gardens, because flowers afford us, by their beauty and fragrance, so much pleasure, and a garden without flowers is a very drab affair. I think, however, that flowers should have a special place to themselves, and not be mixed up with the vegetables. There should be in every school garden a flower border and, if possible, a rock garden.

Flowers are divided into annuals, biennials and perennials.

Annuals are flowers that grow, flower, seed and die in one season.

Biennials are sown one year, flower the next, and die.

Perennials live more than two years, and are propagated either by seeds, cuttings, or by dividing the roots.

Great strides have been made during the past few years in the improvement of all kinds of flowers. As a poor variety takes up as much room as a good variety, care should be taken that no poor variety is allowed to exist in a school garden, and, for that reason, named varieties of perennials should be grown. Where varieties are raised from seeds, only those from a good seedsman should be sown.

Annuals are either hardy or half-hardy. The former

should be sown in patches in fine soil, in late March or early April. The plants should be thinned out early to at least 3 in. apart, and in most cases to 6 in., but that depends on the variety. Some will be better a foot apart. The thinnings may be transplanted if taken up carefully. Annuals, as usually grown, are weedy, but that is due to the fact that they are allowed to grow too thickly, and are not given room and air to develop properly. Give them plenty of room and the flowers will be finer, and the period of flowering will be much longer. It is a good plan to grow a few sorts that are well known, and each year add another sort that is not so well known. Among the annuals try candytuft, mignonette (on firm ground, with mortar, rubble or lime added), clarkias, godetias, Shirley poppies, nasturtiums, and last, but not least, sweet peas, which deserve a chapter to themselves, as they are certainly one of our sweetest and finest garden flowers.

Half-hardy Annuals.

These require the protection of a frame during their seedling stage. Sow in boxes on a slight hotbed in March or early April. The soil in the boxes should consist of 4 parts turfy loam, 1 part leaf soil, and ½ part rotted manure, with enough sand to keep the soil open. Put a layer of partly rotted leaves at the bottom of the box for drainage. The box should have holes bored in the bottom. The soil should be wet enough to hold together when pressed in the hand, but dry enough to fall to pieces when dropped on the potting bench. Transplant the seedlings when they can be handled, 3 in. apart, and grow on. Harden off and plant out with a trowel about the middle of May,

during showery weather, with as much soil adhering to the roots as possible.

Half-hardy Annuals.—Ageratum (dwarf) and lobelia (edging plant), asters, marigolds, nicotianas (tobacco plants), phlox drummondi, stocks, verbenas and zinnias.

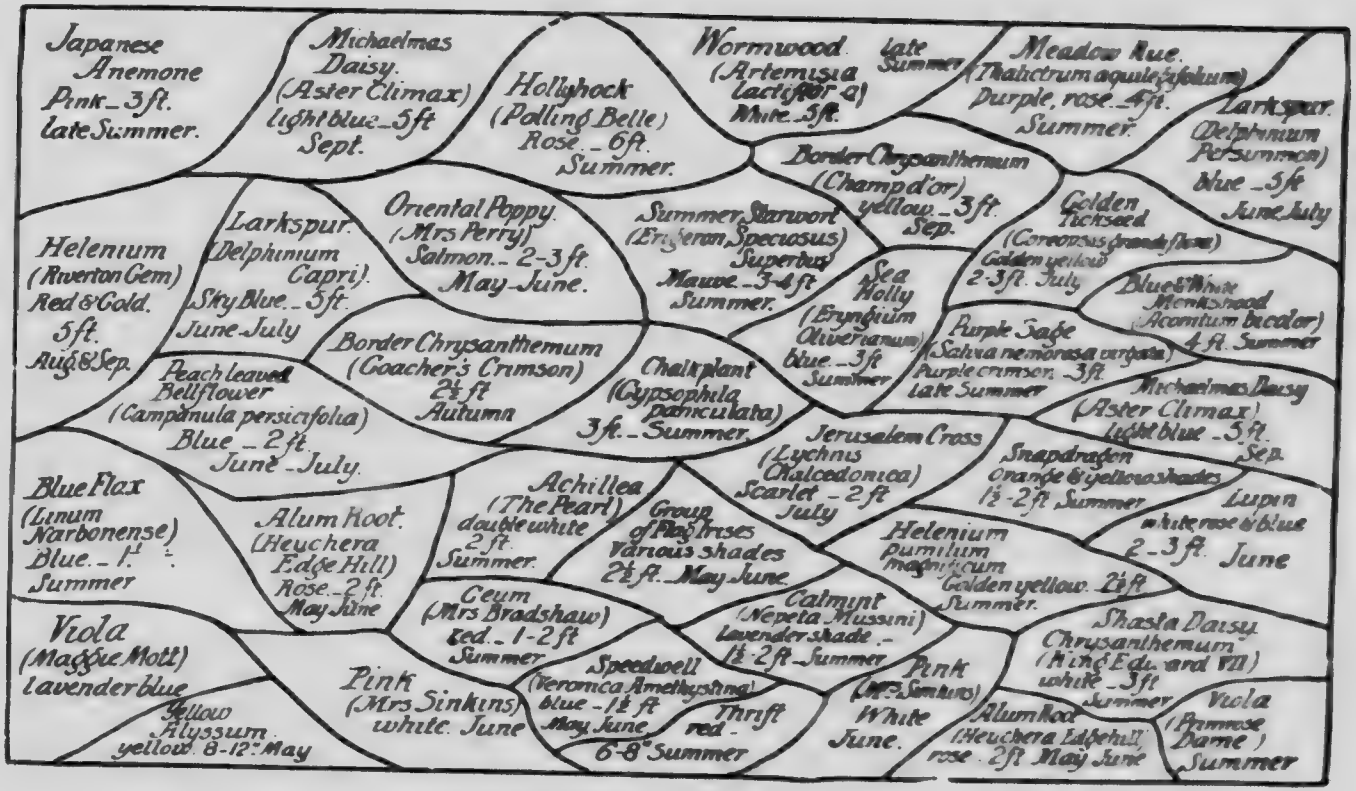
Biennials.—These include foxgloves, sweet williams, forget-me-nots, Canterbury bells, and the chimney bell flower (both campanulas), and wallflowers. The latter are really perennials, but are best treated as biennials.

All are best sown in May, and transplanted into beds, using shady ones for forget-me-nots and foxgloves. They may all be taken out of the nursery beds in late September and early October, and planted in their permanent quarters.

Wallflowers should be grown in rather poor, firm ground. If the stems are sappy, they are very likely to be killed by the frost during the winter.

Perennials.—These are divided into herbaceous and woody perennials. The stems of the former die down during the winter, while the stems of the latter do not. It is only with a few we can deal here.

The herbaceous border must be deeply dug, and well-manured, and the soil allowed to settle before planting. The height and colour of the plants must be noted. Care must be taken that the colours do not clash, and that the lower growing plants are not hidden by the higher ones. After cultivation must be carefully done, as many plants entirely disappear during the winter. The position of each plant should be marked with a label, so that in weeding and hoeing the plants are not injured. A good dressing with rotten manure in spring



PLAN—HARDY FLOWER BORDER

will be beneficial. It is best to plant in groups of three or four. Allow plenty of room for the plants to develop. Take note of the period of flowering, so that from spring to autumn there is always a good display of flowers. Do not allow too many stems to develop on any one root, e.g. three or four stems is quite sufficient for one root of phlox or Michaelmas daisies, or otherwise the blooms will be poor. Find out what particular class of plants do well in the neighbourhood, and grow them, but repeat, grow good varieties only, and add one or two new varieties each year.

Among the perennials grow violas, pinks, carnations, antirrhinums (take cuttings each year), phlox (Mrs. Jenkins is a fine variety), delphiniums, aquilegias (long-spurred hybrids—delightful flowers), gypsophila paniculata (fine for mixing with cut flowers—sweet peas especially), coreopsis grandiflora (divide annually), Geum (Mrs. Bradshaw), rudbeckias, paeonies, campanulas, early flowering chrysanthemums in variety (Pluié D'Argent is a fine white variety), irises, polyanthus, primroses. When propagating perennials from old clumps always plant pieces from the outside of the clumps. This part of the clump will give more vigorous plants than will otherwise be obtained.

Bulbous Plants.

We depend largely on bulbs for our spring display of flowers, and as flowers are more welcome at that period than at any other part of the year, bulbs must find a place in every flower garden. Bulbs are of three kinds—tunicated, scaly and corms.

Tunicated bulbs are made up of leaf stalks completely enfolding one another, and enclosed in a

covering—tulips, hyacinths and daffodils belong to this family.

Scaly bulbs are made up of fleshy, scaly leaf stalks overlapping—lilies are of this class.

Corms are solid, and show none of the divided structure of the two first named when cut through—crocuses and gladioli are examples of this variety. When these are dug up in the autumn a new corm will be formed growing on the top of the old one.

Bulbs require a well-drained soil with plenty of grit in it. In heavy ground it is a good plan to put sand under each bulb and in some cases to cover the bulb with sand.

Spring-flowering bulbs should be planted early in autumn—the earlier the better. If a daffodil be dug up in August new roots will be found growing at the bottom of the bulb.

Lilies and gladioli are best planted in spring with the exception of the Madonna lily which should be planted in August.

Many lilies are subject to a fungoid disease, and for that reason it is a good plan to dust them freely with sulphur when planting. Lilies do best if left undisturbed for several years. Gladioli should be dug up in autumn, tied in bunches, hung up in a dry place, and when the foliage is dead the corms should be stored for the winter.

The foliage and stems of bulbs of any description should never be cut off before they turn yellow.

CHAPTER XXIX

Roses

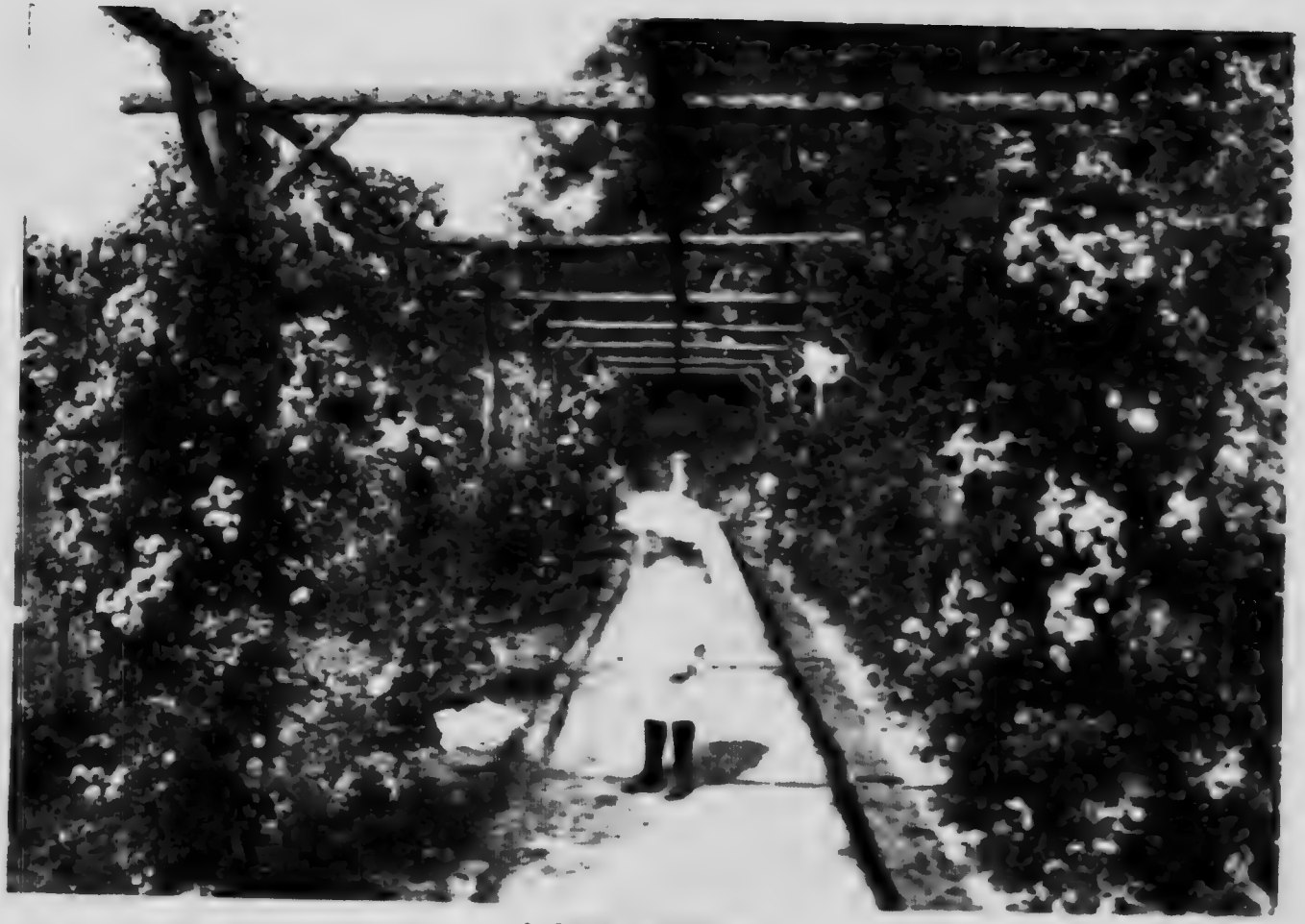
A PLACE must be found in both school and cottage garden for roses. They are best grown in a bed reserved for them only. The bed should be in an open sunny position and yet shaded from cutting east and north winds. If any other flower is grown with them let it be violas. These form a good edging and may be dotted about the bed, though the latter is not recommended.

Climbing Roses.

The rose family is a large one and includes many of our fruits. The resemblance of a green hip of a rose to a young apple or pear is very striking.

Roses like a greasy loam, though tea roses do well in lighter soil. Heavy soil may be lightened by the addition of road sweepings, and stable manure, while light soil may be made more suitable by the addition of cow and pig manure, but any soil where roses are to be grown must be deeply dug and well manured. Prepare the ground some time before the roses are planted, mixing plenty of manure to the second spit, and adding crushed bones and basic slag (½ lb. to the square yard) to the top soil.

Plant the roses 2 ft. apart spread out the roots well, and make them firm. Be careful not to plant too deeply. If the stem of a bush rose is examined, a knobby part will be seen just below the branches. This is where the rose was budded on the stock.



A ROSE PERGOLA

Plant this about 2 in. (not more) under the soil. Roots will then form from the rose itself. Late October or early November is a good time for planting, but March is also a good time—perhaps the best for tea roses.

If planting is done in the spring, mulch the surface of the ground with short manure. Some growers advise this to be done after autumn planting, but where the ground is heavy, this is likely to cause the ground to become sodden and sour. As manure on the bed is not sightly it may after a time be lightly pricked in with a fork. Standard and bush roses may be planted alternately, and then the distances between the plants may be decreased.

Roses are gross feeders, and after the first year liquid manure may be freely given to them—weak and often, but cease doing so in July, or the growth will fail to ripen properly, and will then be easily injured by frost.

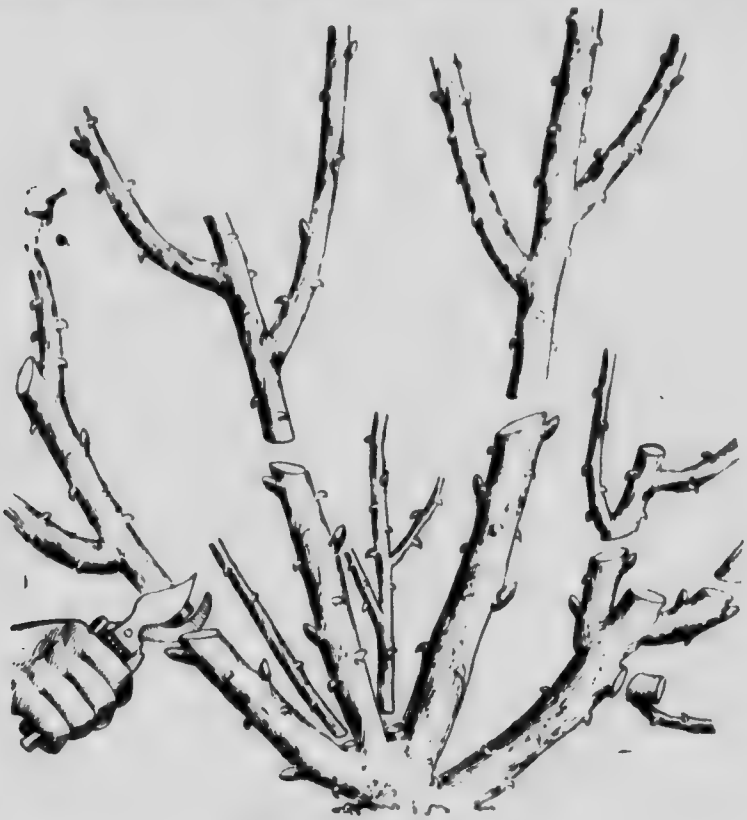
Climbing roses may be used on pillars and arches. Hiawatha (single red), Dorothy Perkins (pink), Excelsa (red), Alberic Barbier (creamy) are a good selection of ramblers. These need no pruning except cutting out of the old stems *after flowering*, and just taking off the soft tips of the young shoots.

Climbing Caroline Testout, Climbing Lady Ashtown, and J. B. Clark make good pillar roses.

Pruning is a very important operation with rose growers, and cannot be fully dealt with here. The first week in April is a good time. It pays to prune all newly planted roses severely, cutting the rose bushes nearly to the ground, and leaving only three or four buds on each shoot.

Afterwards when pruning first cut out all dead wood and all twiggy growths. Be careful to leave no buds at

the base of these growths. Always prune to a bud pointing outward, and prune so that the centre of the



Pruning a Bush Rose

bush is open. Four or five strong shoots are quite sufficent for each bush.

A general rule in pruning is to prune weak growers severely and strong growers less severely. With strong growing roses like Hugh Dickson and Frau Karl Druschki, it is a good plan to take off the tips of each long shoot, bend them over and tie to a peg in the ground. Frost injures the shoots; then the pith turns brown. In pruning always cut back to the white pith.

Light pruning generally gives plenty of poor blooms, while severe pruning gives fewer blooms, but finer roses. It is better to prune too severely than too lightly.

Pruning a Standard Rose

The number of roses is legion. Grow none but named varieties. They are cheap, and the stock can soon be increased by budding and cuttings.

A good dozen would be :—

Hybrid Perpetuals.—Frau Karl Druschki, white ; Hugh Dickson, red ; Mrs. John Laing, pink.

Hybrid Teas.—Geo. Dickson, dark red ; Madame Abel Chatenay, salmon ; Lady Ashtown, pink ; Caroline Testout, pink ; Mad. Segond Weber, pink ; Madame

Ravary, yellow; or Duchess of Wellington or Mad Melanie Soupert.

Teas. — Harry Kirk, yellow; Lady Hillingdon, yellow; Mrs. H. Stevens, white.

Roses are generally budded on the wild rose, but other stocks, e.g. Manetti, are sometimes used. For methods of raising roses see Budding (page 143) and Cuttings (page 137).

Pests.

Roses are attacked by many pests. Vigorous healthy trees are least liable to attack. Deal promptly with pests of any kind.

Green-fly is perhaps the worst enemy of the rose. This has been dealt with elsewhere. Syringeing with an insecticide immediately one appears, and continuing to do so as long as one remains will get rid of this pest. Various caterpillars also infest the trees. The worst is the maggot, which destroys the buds. Immediately the young growth appears, syringe with a solution of arsenate of lead. This should be obtained in the form of a paste and used according to directions. Be careful not to make the solution too strong. Other caterpillars eat the leaves. Arsenate of lead applied by syringeing will poison them. Injury to the leaves will decrease the vigour of the trees. Various fungoid diseases, e.g. mildew and rust, also attack the foliage. Syringeing with sulphide of potassium (liver of sulphur) ½ oz. to each gallon of water, applied in late June and July, will often avert these attacks. Should the plants suffer in summer from fungoid attacks, syringe during the succeeding winter with copper sulphate (blue-stone) ½ oz. to 1 gal. of water.

RECORDING THE RAINFALL IN A SCHOOL GARDEN

CHAPTER XXX

Gardening Calendar

November.

General. — Dig, ridge, or bastard trench vacant ground (heavy soils). Clear asparagus beds of dead stems, weeds, etc., lightly fork up surface, and cover with rotten manure. Finish earthing up celery. Broad beans may be planted on warm border.

Fruit.—Plant fruit trees, roses, and bushes of all kinds.

Flowers.—Bulbs may still be planted. Dig up gladioli, dahlias, and begonias, dry and store. Plant out herbaceous plants, wallflowers, Canterbury bells.

December.

General. — Continue digging, etc. in favourable weather.

Fruit.—Planting fruit and rose trees still be done. Prune fruit trees except in frosty weather. Spray fruit trees with caustic winter wash. This may be done at any time during winter while the buds are dormant. Examine stores of potatoes, onions, etc.

January.

General. — Order seeds. Prepare plans of plots. Test seeds. Prepare labels. Get stakes ready. Prepare manure for hotbeds. Sow onion seeds in boxes in frames (late in month). Box seed potatoes, place in

light, and protect from frost. Broad beans may be sown. Manure ground in frosty weather, but do not dig the soil during frost or snow.

February.

Prepare onion beds when the soil works well. Sow early peas (round seeded), broad beans in warm borders. Sow lettuces, leeks and radishes in frames. Finish pruning and winter washing fruit trees. Sow sweet peas in pots and place in cold frame. Make new rhubarb beds. Apply lime. Plant Jerusalem artichokes and shallots.

March.

The busiest month of the year.—Sow onions, parsnips, peas (round seeded), broad beans, Shorthorn carrots, cabbage, brussels sprouts, cauliflowers, early broccoli, parsley, celery, leeks, turnips (early Milan), radishes. Sow tomatoes for early outdoor planting. Commence grafting towards end of month. Sow half-hardy annuals in warm frame. Sow hardy annual flower seeds. Prune hybrid perpetual and hybrid tea roses during the last week. Begin to look out for pests. American blight (paint with methylated spirit). Green-fly on wall roses. A few potatoes may be planted if protection can be given, but postpone bulk of planting till the middle of April. Roses may be planted as early in the month as possible.

April.

Complete sowings of last month for succession. Sow peas (wrinkled), beet (round), early in month, and beet (long) later, carrots. Complete grafting of fruit trees

and pruning of roses (early). Sow winter greens of all sorts and maincrop celery. Plant potatoes of all sorts (April 15). Insect pests will begin to appear. Dust lime and sulphur on black currant bushes as the bud mite will be moving about the branches. Take steps to check ravages of onion and celery and parsnip fly. Take cuttings of sage and thyme, and make new mint beds. Transplant seedlings when they can be handled. Plant out from frames (end of month) violas, pentstemons, snapdragons, calceolarias and carnations. Gradually harden off seedlings in frames for planting out. Sow vegetable marrow seeds in pots.

May.

Sow kidney beans (early), runner beans (middle), peas for succession, lettuces, radishes, but continue pricking out seedlings. Harden off seedlings in frames and plant out towards end of month. Plant out tomatoes (late in month); prepare celery trench.

Insects very active. Spray apple trees (immediately petals fall) and rose trees with arsenate of lead solutions. Gooseberry trees (if attacked with mildew), with liver of sulphur solution. Continue to take steps to prevent ravages of onion, carrot and celery fly. Sow biennials, wallflowers, Canterbury bells, foxgloves, etc. and perennials. Aquilegia, delphinium, geum, pyrethrum, etc. Mulch strawberry beds, remove runners. Commence thinning.

June.

Continue fight against insect pests. Little danger now from frost, plant out tender plants, vegetable marrow, ridge cucumbers. Plant out winter greens of

all sorts. Pay attention to staking. Plant out celery. Keep the hoe going. Sow spinach, dwarf beans and lettuce.

July.

Spray potatoes early in month and again later Continue planting out "greens" as ground becomes vacant. Spray roses with sulphide of potassium to prevent or check mildew. Feed roses with liquid manure Bud roses and fruit trees and begin summer pruning of fruit trees. Sow spring cabbage (third week, and turnips. Harvest shallots. Layer carnations. See that flowering plants are well staked. Keep the hoe going.

August.

Sow autumn onions, turnips and spring cabbage (second week). Finish budding roses. If mildew appears spray with potassium sulphide (½ oz. to 1 gal. of water). Earth up early celery and make new strawberry beds. Bend over tops of spring onions to hasten ripening.

September.

Lift potatoes as they ripen, and harvest onions. Propagate roses, laurels, etc. by cuttings.

October.

Propagate by cuttings snapdragons, pentstemons, violas, calceolarias in cold frames. Lift and store potatoes, carrots, beet, etc. Plant out spring cabbage. Clear off all rubbish and commence digging. Commence planting fruit and rose trees (end of month).

CHAPTER XXXI

Fruit for the School Garden

Apples (Cooking).—Bramley's Seedling, Lane's Prince Albert, Lord Grosvenor, Warner's King. (Dessert.)—Cox's Orange Pippin, Worcester Pearmain, King of the Pippins.

Pears, Fertility.—Doyenné du Comice, Winter Nelis.

Plums.—Greengage, and Coe's Golden Drop (dessert). Victoria, Monarch.

Black Currants. — Boskoop Giant, Prolific, Baldwin's.

Red Currants.—Ruby Castle, Comet.

White Currants.—White Dutch.

Gooseberries.—Whitesmith, Lancashire Lad, Whinham's Industry, Keepsake.

Raspberries. — Superlative, Baumforth's Seedling.

Strawberries.—The Laxton, Royal Sovereign, King George.

Vegetables for the School Garden

Beans (*Broad*).—Improved Windsor, Prolific Longpod.

Beans (*French*).—Masterpiece, Canadian Wonder.

Beans (*Runner*).—Scarlet Emperor, Best of All.

Beet.—Improved Globe, Cheltenham Green Top.

Broccoli.—White and Purple Sprouting, Snow's Winter White, Leamington, Kelway's Mammoth.

Brussels Sprouts.—The Wroxton, Scrymger's, Matchless.

Cabbage.—Wheeler's Imperial, Harbinger, Eliams Early (autumn sowing), Express, Winnigstadt (spring sowing).

Carrots.—Early Nantes, Early Gem, Scarlet Model, Scarlet Intermediate, James's Intermediate, Carter's Red Elephant, Altrincham.

Celery.—Sandringham White, Standard Bearer, Leicester Red.

Cauliflowers.—Early London, Autumn Giant, Walcheren.

Cucumbers (Ridge).—King of the Ridge. (Frame)—Telegraph, Lockie's Perfection.

Leeks.—Aytoun Castle, Lyon, Emperor.

Lettuce (*Cabbage*).—Webb's Wonderful, Commodore Nutt, Favourite. (*Cos*).—Exhibition, Crystal Cos, Paris White.

Onions (Autumn Sown).—Giant Rocca, Ailsa Craig (Spring Sown).—Bedfordshire Champion, James's Keeping, Premier, Rousham Park Hero.

Parsley.—Crested Gem, Myatt's Garnishing.

Parsnips.—Marrow, Student, Hollow Crowned.

Radish.—French Breakfast, Long Scarlet, Turnip (summer), China Rose (autumn).

Shallots.—True small variety, not the coarse red one.

Spinach.—Victoria Improved (round), New Zealand Prickly, Perpetual Spinach Beet, Seakale Beet.

Tomato.—Early Dawn, Sunrise, Open Air, Kondine Red, First Crop, Moneymaker.

Peas.—William Hurst, Little Marvel, Laxtonian (dwarf), Pilot (4 ft.), Gradus (4 ft.), Daisy (2 ft.), Senator (3 ft.), Sutton's Maincrop (3 ft.), Autocrat (4 ft).

Potatoes (Early).—Puritan, May Queen, Midlothian Early, Sharpe's Express. (Second Early).—British Queen, Great Scot, Windsor Castle. (Late).—Arran Chief, King Edward VII., Factor.

TABLE OF SOWING AND PLANTING

Vegetables	*Months to sow or plant*	*Weeks to mature*	*Depth to sow in in.*	*Distance apart in inches*	*Quantity of Seed required*
BEANS, BROAD	Nov., Feb., Mar.	14	3	24 × 6	1 qt. = 80 ft.
„ DWARF	April, May	12	3	24 × 6	1½ pt. = 80 ft.
„ S. RUNNER	May, June	12	3	72 × 12	1 pt. = 80 ft.
BEETROOT	April, May	15—20	2	12 × 9	1 oz. = 50 ft.
BORECOLE or KALE	March, April	32	½	30 × 24	
BROCCOLI	March, April, May	30—50	½	24 × 24	½ oz. yields several 100 plants
BRUSSELS SPROUTS	February, March	24—32	½	30 × 24	
CABBAGES	March, July, August	20—30	½	24 × 18	
CARROTS	March, April, May	18—24	1	15 × 9	1 oz = 80 ft.
CAULIFLOWERS	February (frame), April	15—20	½	30 × 24	(see CABBAGE, do.)
CELERY	February (frame), March	24	Just cover	48 × 9	A pinch or two
CRESS	March to August	1½—2	do.		
CUCUMBER	March (frame)	9—18	1	pots	12 seeds
LEEKS	March	24—32	1	24 × 9	(see CABBAGE)
LETTUCES	Feb., Mar. (frame), Mar.-July	10	½	12 × 6	do.
MUSTARD (see CRESS)		1—2			
ONIONS	Feb. (frame), Mar., Ap., Aug.	16—18	1	12 × 4—9	1 oz. = 200 ft.
PARSLEY	March—June	16	½	12 × 6	1 oz. = 80 ft.
PEAS	February—June	12—15	3	24 × 2 36 × 3 72 × 6	1 pt. = 60 ft.
POTATOES	March (few)—May	10—24	4—6	24 × 12 30 × 18	About 10 lb. per square rod
RADISHES	February—May	6—8	1	...	1. oz. = 100 ft.
Do. CHINA ROSE	July—August	10—12	1	12 × 4	
RHUBARB CROWNS	March	52	4	36 × 36	
SAVOYS	March—May	24—30	(see CABBAGE)		
SHALLOTS (bulbs)	February	15—16	Half buried	12 × 9	360 sets per sq. rod
SPINACH	March—August	10—14	1	18 × 6	1 oz. = 10 ft.
TOMATOES	February and Mar. (heat)	20	1	24 × 24	50 seeds in pots
TURNIPS	March—May, July—Aug.	8—10	1	12 × 9	1 oz. = 100 ft.
VEGETABLE MARROWS	April—May	10—12	1	15 sq. yds. each	1 pkt. yields several plants
Do. do. BUSH	do.	10—12	1	36 × 36	

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